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Chilton's Food Engineering

November 1982

$3.00

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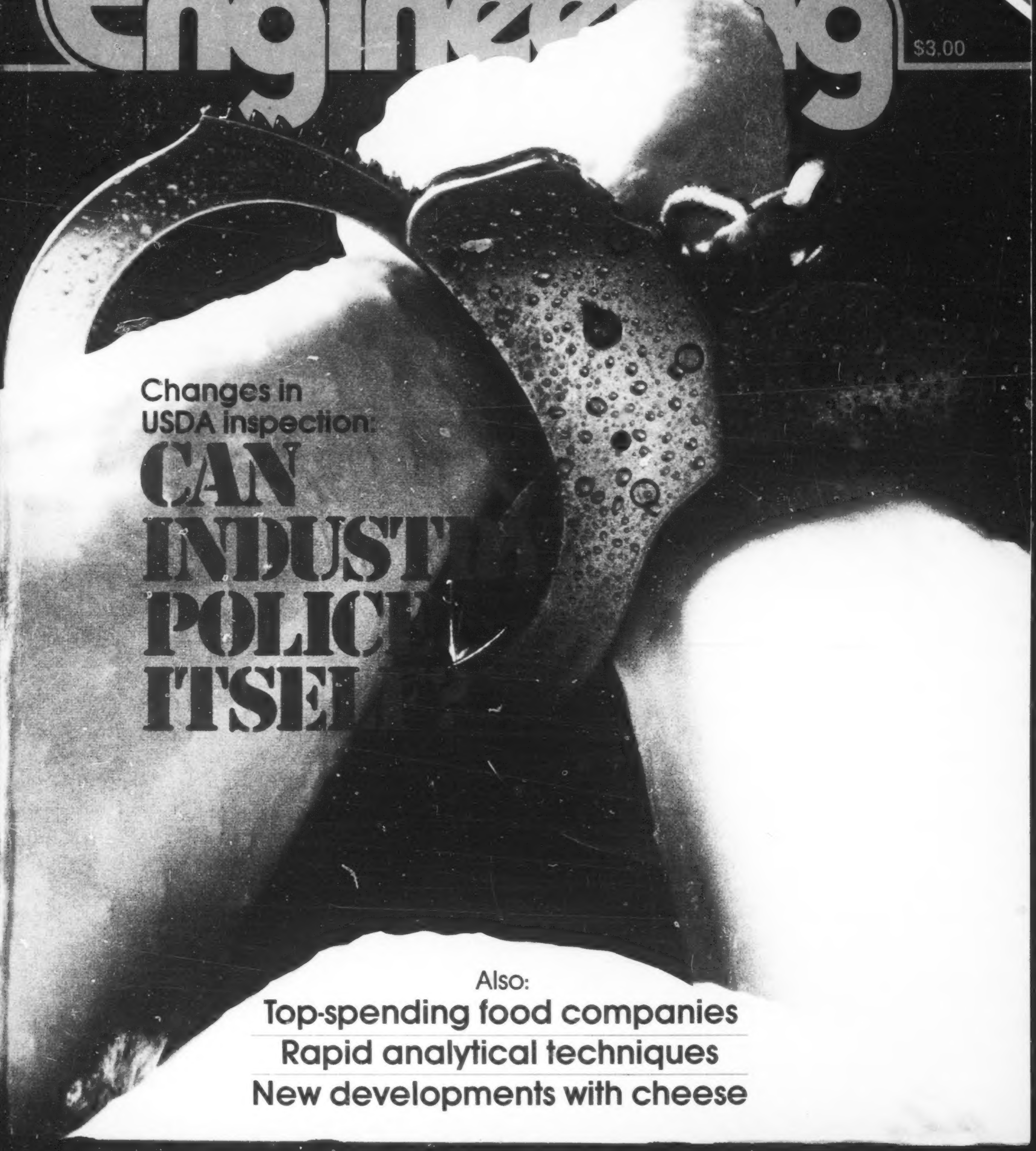

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TOP-SPENDING COMPANIES: Capital expenditures for the top 50 food companies are listed and analyzed in this special report. Overall, food company spending is up 6.6% from last year.

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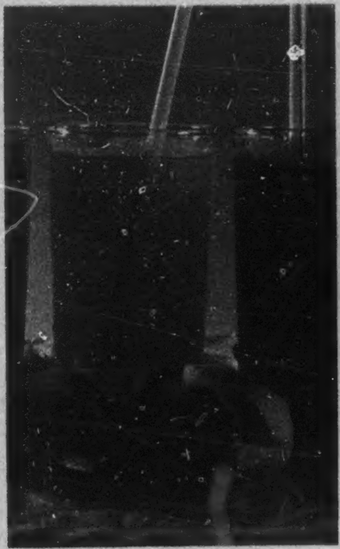

STABLE FLAVORS: Improved technology has made possible a line of very stable encapsulated essential oils and flavor chemicals.

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RAPID LAB TESTS: On display at this year's IFT Show were a host of rapid analytical techniques. Here's a look at some of them.

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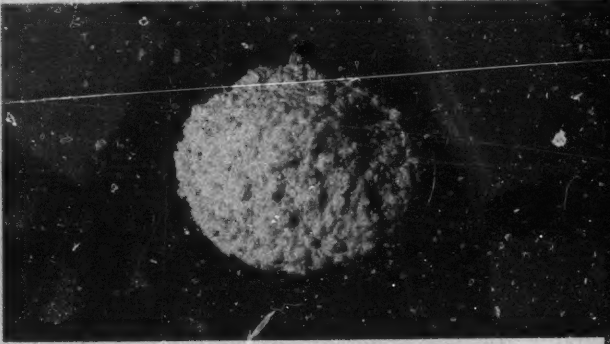

NEW DEVELOPMENTS WITH CHEESE: Four separate articles in this issue address this topic: (1) A new cheese preservative—**page 60;** (2) A cheese concentrate that gives better cheese flavor with less cheese—**page 64;** (3) A new cheese powder that bounces back, on rehydration, to provide "stretchiness;"—**page 53** (4) A comparison of techniques to determine the amount of salt in cheese—**page 83.**

FOOD ENGINEERING® (ISSN 0193-323X). November 1982, Vol. 54, No. 11 Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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POSTMASTER: Send form 3579 to Food Engineering, Post Office Box Number 2035, Radnor, Pa. 19089.

Events

Is FDA "going soft"?

Declines in enforcement statistics are not necessarily the result of laxity, the agency retorts.

Top Food and Drug Administration officials have gone on the defensive recently in an effort to throw cold water on a smoldering issue that could prove very harmful to the agency and the Reagan administration's efforts towards regulatory reform if it should flare up in the general media.

Earlier this year a consumerist health group in Washington, the Health Research Group, issued an analysis of recent FDA legal actions and found that they had decreased 45 percent from the average level of the past four years. In July, HRG sent another report to Representative Dingell, who is influential in the health area, which purported to show a further decrease — to 66.4 percent — for the current six-month period when compared with the same period for the years 1977 through 1980.

HRG claims that these figures show that the agency is "getting soft" on the industries it is supposed to be scrutinizing, and that, furthermore, consumers are less safe now than they were 18 months ago, and that FDA had entered into a "corrupt partnership" with industry. Dingell promised to look into the charges, and although hearings have not been called for, the agency is now trying to quell such a possibility by going public with its own interpretation of what it admits are declines in some indexes of enforcement in the last 18 months.

In major speeches recently both FDA Commissioner Arthur Hull Hayes, Jr., and agency Chief Counsel Thomas Scarlett, came down hard on HRG's interpretation of FDA enforcement figures. Said Scarlett to a meeting of the Regulatory Affairs Professional Society in September:

"The major flaw in HRG's argument is that although the enforcement statistics are down, it does not logically follow that consumer protection has suffered. The enforcement indicators do not directly measure the amount of consumer protection FDA's regulatory system provides; they merely provide a census of some of the more readily enumerated compliance techniques available to the agency.

"Whether the statistics provide an accurate indirect measure of FDA's effectiveness is a question that HRG has made no attempt to answer. Clearly, the statistics are relevant and their significance must be evaluated. Equally clearly, however, it is misleading to promote them as a complete picture of FDA's commitment to achieving compliance with the law, for they leave out far too much. They leave out, for example, the fact that FDA has recently conducted over 300,000 audit checks in a major Class I recall."

Regulatory reform is not "deregulation"

In his response to the HRG charges, FDA Commissioner Hayes told a meeting of the Health Industry Manufacturers Association meeting this fall, "It is worth pointing out that compliance numbers are not the be-all and end-all as an index of consumer safety. But the numbers themselves are not the main point at issue. For HRG has gone beyond the numbers to cite what it claims are examples of FDA's 'partnership' with industry. The implication is that this partnership works against the best interests of the public.

"That is a charge I absolutely deny . . . To argue that these enforcement figures necessarily mean decreased consumer safety presents what I view as a serious conceptual problem. To do so, it seems to me, is analogous to observing that a decrease in traffic tickets automatically means that more traffic violations are going undetected. It is equally plausible — and perhaps more compelling — to conclude that a decrease in traffic tickets means that compliance with the law is increasing.

"That logical objection aside, however, the question of how to interpret these numbers can be examined from a number of perspectives. Let me outline several that make sense to me. The burden of the argument HRG makes is that FDA has become a paper tiger. That it deliberately entered into an inappropriate partnership with industry. This argument, I believe, is seriously flawed. In practical terms alone there exists no reason for FDA to grow soft on enforcement. I know of no constituency anywhere — including industry — that opposes enforcement of laws designed to protect the safety of the American public and the integrity of the marketplace . . .

"Another drawback is more telling. If HRG were correct that FDA has grown lax on enforcement, we would expect the criminal referrals would provide a major target for cutbacks. No such cutback has occurred. So far in fiscal year 1982, FDA has referred 18 criminal cases to U.S. attorneys' offices. This compares with a range of 22 to 32 annually during the four-year baseline period. Even were we to assume the referral of no more prosecutions this year, the figure to date represents an insignificant difference in criminal referrals."

MEL SELIGSOHN, News Editor

(Continued on next page)

←Circle 16 on Inquiry Card

FDA Soft? . . .

Saying that the decline in some indexes of enforcement recently "may be temporary or part of a long trend—or a little of both," FDA officials noted these long term developments that are now impacting on statistics on enforcement actions:

1. *There has been an emphasis on cooperative approaches to compliance.* Citizen Advisory Committees in 1955 and 1962 said greater emphasis should be placed on cooperative approaches to obtain compliance. In the 1955-65 administration of the last career inspector to be raised to FDA Commissioner, George P. Larrick began emphasizing education and voluntary actions. His successors seemed to emphasize the change even more, being brought in to head FDA, rather than being people with an FDA enforcement background.

In a 1967 speech, the first physician to be Commissioner in 45 years, Dr. James Goddard, said, "Promoting compliance in products and labeling is the primary goal whether accomplished by research, educational activities or enforcement proceedings. . . . Increased emphasis on administrative sanctions rather than on enforcement by court actions stems from the kind of problems which now confront FDA."

The current administrator, Dr. Hayes, believes very strongly in voluntarism, saying that it can often produce results faster and at less cost. "I believe in increased cooperation and dialogue between FDA and all interested parties to resolve public health issues of mutual concern. This principle may seem obvious, but it lies at the heart of what I'm trying to achieve. This is the sense in which I intend government to form a partnership with other constituencies—to work together to protect and promote the public health. FDA's current sodium initiative offers an excellent example of the sort of mutual effort I have in mind," Dr. Hayes asserted recently.

Cooperation is replacing regulation

Starting in FY 1982, FDA's field organization began a voluntary correction reporting system. For the first six months, a total of 2,466 voluntary corrections were verified; in 502 cases, the voluntary correction action involved destruction of product — negating, in some cases, the need to seize or enjoin.

2. *Violations—the "crime rate"—may be down.* As part of the emphasis on cooperative action, FDA has put forth a variety of regulations and standards that make clear what processors must do to comply with the law, and that thereby make compliance more likely without frequent enforcement action.

Among these are Good Manufacturing Practice Regulations (GMPs). Overall compliance in inspections of the food industry has increased from about 78 percent in 1975 to about 90 percent in 1981. Warehousing has improved partly as a result of a program of workshops FDA has held for some warehouse operators. Inspectors today find violations in slightly less than 10 percent of the warehouses inspected, compared with 60 percent a decade ago.

3. *The food industry and other regulated industries have changed.* For example, 25 years ago a single inspector might check several different breweries owned by different companies. Today a few national companies dominate the industry, maintaining full-time quality control staffs utilizing computerized practices much different from those of the past.

Short-term factors

1. Enforcement statistics are influenced by emergencies. Major recalls in the early 1970's diverted manpower from inspections or other enforcement activities. Similarly, while the number of recalls was down in early fiscal 1982, one of those was one of the most complex and largest in FDA history—the Alaska canned salmon recall. This required the diversion of personnel from inspections and other activities in order to participate in 312,000 audit checks of retail outlets.

2. The number of field investigators-inspectors has declined from 1,182 four years ago in fiscal 1978 to 903 in fiscal 1982, as part of an overall trimming of FDA and the federal government in general under the Reagan and Carter administrations. This reduction was

(Continued on page 25)

FDA Enforcement Actions *(fiscal years 1977/82)*

1977	1978	% change	1979	% change	1980	% change	1981	% change	1982	% change
Prosecutions										
32	21	−28	21	—	22	−5	18	−14	18*	—
Injunctions										
40	32	−20	30	−6	21	−30	13	−38	11*	−15
Seizures										
530	402	−24	541	+35	539	−.4	276	−49	165*	−40
Recalls										
888	1,116	+26	1,290	416	864	−33	658	−24	554*	−16
Regulatory Letters										
395	422	+7	361	−15	783	+117	198	−75	114*	−42
Inspections										
30,401	28,760	−5	32,787	+14	32,778	—	36,258	+11	21,588**	−41

FDA officials are busy explaining the general declines in enforcement actions.

*to 8/15 **to 6/15 **NOTE:** *FY begins 10/1*

FDA . . .

sharpest in 1979.

3. Implementation of the Civil Service Reform Act in 1978 may have introduced uncertainties respecting the priorities assigned to different types of enforcement activities. FDA is examining approaches to deal with any misunderstanding that may exist as a result of recent managerial initiatives aimed at promoting the most efficient allocation of investigatory and enforcement resources.

Some trends are steady or up:

- Total recalls in 1982 should be higher than 1981, if present trends continue;
- Inspections were higher in 1981 than in any of the previous five years;
- Prosecutions reached 18 in the first 10½ months of fiscal 1982, and this could easily provide a year at the average of recent years. Moreover, the cases tend to be of greater significance and complexity than in some past instances, according to the Office of the General Counsel.
- Import detentions remain high.

Economic crackdown

Along with explaining its record to the public and potentially hostile lawmakers, FDA has embarked on some new programs aimed at shoring up its obviously strained posture of vigilance in the food area. The most dramatic of these is a pilot economic crackdown program on short weights and product substitution.

Times of economic stress, such as the current recession, tend to breed more violations of this nature than usual. Consequently, FDA has ordered its District Offices "to take quick, aggressive legal action" when economically deceptive practices are uncovered. A number of such actions involving short weights and substitution are already in the works.

Economic crackdown is underway

The pilot project has District Offices concentrating on eight products. Products being surveyed for net weight violations are: Instant tea, instant coffee, spices, chocolate products and nuts. Analyses of breaded shrimp for excess breading; apple juice for substitution with water and/or added sweeteners; and olive and sesame oils for substitution with corn and/or cottonseed oil have also been ordered by the agency.

FDA pointed out because the agency has not given economic work the highest priority and because of current economic conditions, "There is concern that economic cheats may be more prevalent than usual. . . . The outcome of this pilot survey is expected to have a significant impact on the future direction of our efforts and the level of resources the FDA will devote to the problem of economic deceptive practices."

One FDA official has suggested that economic pressures have also resulted in food firms' reducing the amount of attention paid to the inspection of packages, which has resulted in defects that have led to massive food recalls. Dr. Robert M. Schaffner, FDA's Associate Director for Physical Sciences, recently told the Glass Packaging Institute that the last 20 years has seen that industry reduce its customer services.

"I think any will have to admit that there are fewer manpower hours devoted to this activity than there were in the 50's and 60's. The container producer and the food manufacturer have had considerable economic pressure to reduce the cost of these containers and technical services are part of the cost of the container," he stated.

Although conceding that the industry's record is good, and that many of the problems related to glass-packed food were probably due to processing errors or sanitation problems, Schaffner urged the industry not to reduce technical services "to the point where your staffs are no longer vigilant in protecting the public health."

Schaffner also urged the industry to expand its research and development, noting the recent improvements in mechanical, electronic, sonic, magnetic and light distorting instruments now used to eliminate glass particle contamination from containers and food filling operations.

"Perhaps your industry might develop some method of jar sterilization not unlike the peroxide applications that have been used for laminated foil-plastic packages. Then these sterilized containers could be aseptically filled with presterilized foods. If the food industry through your development had such a new tool, they could offer the public a really improved food with greater eye appeal, fresh-like flavor and improved nutrition. All of this would be packages of container integrity and safety," he concluded.

Aware that charges of "softness" in the regulatory area could reflect poorly on current administration philosophy, FDA officials are busy explaining that regulatory reform by no means is the same thing as "deregulation." "This administration is not committed to the root-and-branch eradication of government," says Tom Scarlett. "What the administration intends to achieve is not the elimination of regulation but the limitation or regulation to those areas in which it is genuinely necessary and, within those areas, to assure the regulation reflects an appropriate balance between the attainment of the regulation's purpose and the costs of the regulation imposed."

More R & D is needed

According to Scarlett, the basic principles of regulatory reform that underpin the administration's current approach are: (1) trust in the integrity of the private sector and confidence that in most instances it can be relied on to safeguard the interests of consumers; (2) confidence that consumers can usually make appropriate decisions concerning their own interests provided they are informed about available choices; (3) where private sector forces do not adequately deal with a problem, and if that problem is sufficient to justify government intervention, the government will take appropriate regulatory action.

"Accordingly, while the government stands ready to relinquish some of the responsibility it has increasingly claimed and to grant a more important role to industry initiatives and consumer education, nothing in the philosophy of regulatory reform requires it to abandon the fundamental public health mission embodied in laws such as the Federal Food, Drug and Cosmetic Act," asserted Scarlett.

Scarlett pointed out that in the case of food regulation, FDA is examining ways of achieving public health protection consistent with the goal of regulatory reform. Earlier this year, for instance, FDA proposed to adopt a risk assessment policy for carcinogenic constituents of food and color additives.

"Enforcement is what happens when something goes wrong with the social contract between FDA and the private sector," Scarlett concluded. **FE**

Are stores carrying fewer brands?

This special study by SAMI shows 7% more brands today than ten years ago—and 24% more items.

In recent months there has been considerable conjecture as to whether shelf space limitations triggered by increased penetration of private label and generic label brands might have caused a reduction in the number of brands and items being carried in food stores.

In order to shed some light on this hypothesis, SAMI prepared a special study comparing ten-year trends in the number of brands and items in 70 selected high-volume categories (food and non-food) appearing in the SAMI system as of June 1982, compared with February 1972.

SAMI recognizes that in February 1972 there were 28 markets in its system as compared with 45 today. "Undoubtedly there are a certain number of local brands and items which have entered our reporting system as our expansion into new markets has progressed," says SAMI. "However, we believe that this study offers strong evidence that there has not been any noteworthy attrition in the number of brands and items being offered to food stores."

Ten Year Comparison of Number of Items

CATEGORY	Items 1972	Items 1982	Change '82 vs. '72	Change
Ready-To-Eat Cereal	623	940	+ 317	+ 50.9%
Regular Coffee	671	773	+ 102	+ 15.2
Dry Dog Food	468	970	+ 502	+107.3
Instant Coffee	360	417	+ 57	+ 15.8
Canned Tuna	314	433	+ 119	+ 37.9
Canned Soup	638	886	+ 248	+ 38.9
Cooking & Salad Oils	576	683	+ 107	+ 18.6
Wet Dog Food	719	834	+ 115	+ 16.0
Pasta	2,623	3,008	+ 385	+ 14.7
Single Strength Juice	872	908	+ 36	+ 4.1
Wet Cat Food	611	743	+ 132	+ 21.6
Soft Drink Mixes	729	906	+ 177	+ 24.3
Pourable Salad Dressings	670	946	+ 276	+ 41.2
Mayonnaise	134	155	+ 21	+ 15.7
Spices & Seasonings	2,996	4,836	+1,840	+ 61.4
Italian Food Sauces	390	569	+ 179	+ 45.9
Dry Cat Food	104	250	+ 146	+ 40.4
Jams, Jellies, Preserves	3,112	2,464	− 648	− 20.8
Pickles	2,801	2,463	− 338	− 12.1
Pork & Beans	345	343	− 2	− .6
Dry Pkg. Dinners	233	298	+ 65	+ 27.9
Apple Juice	218	430	+ 212	+ 97.2
Canned Corn	328	331	+ 3	+ .9
Frozen O.J.	183	215	+ 32	+ 17.5
Frozen Pizza	520	972	+ 452	+ 86.9
Frozen Fish	2,221	1,986	− 235	− 10.6
Frozen Potatoes	886	689	− 197	− 22.2
Frozen Reg. Dinners	300	399	+ 99	+ 33.0
Frozen Corn	184	172	− 12	− 6.5
Frozen Mexican Food	229	896	+ 667	+291.3

Source: *SAMI*

Ten Year Comparison of Number of Brands

CATEGORY	Brands 1972	Brands 1982	Change '82 vs. '72	Change
Ready-To-Eat Cereal	186	219	+33	+ 17.7%
Regular Coffee	88	91	+ 3	+ 3.4
Dry Dog Food	82	154	+72	+ 87.8
Instant Coffee	70	76	+ 6	+ 8.6
Canned Tuna	74	63	−11	− 14.9
Canned Soup	83	87	+ 4	+ 4.8
Cooking & Salad Oils	131	143	+12	+ 9.2
Wet Dog Food	153	105	−48	− 31.4
Pasta	104	123	+19	+ 18.3
Single Strength Juice	122	115	− 7	− 5.7
Wet Cat Food	85	64	−21	− 24.7
Soft Drink Mixes	61	74	+13	+ 21.3
Pourable Salad Dressings	81	88	+ 7	+ 8.6
Mayonnaise	48	53	+ 5	+ 10.4
Spices & Seasonings	117	194	+77	+ 65.8
Italian Food Sauces	72	100	+28	+ 38.9
Dry Cat Food	11	45	+34	+209.1
Jams, Jellies, Preserves	151	123	−28	− 18.5
Pickles	216	126	−90	− 41.7
Pork & Beans	79	68	−11	− 13.9
Dry Pkg. Dinners	36	52	+16	+ 44.4
Apple Juice	64	95	+31	+ 48.4
Canned Corn	88	85	− 3	− 3.4
Frozen O.J.	62	50	− 8	− 12.9
Frozen Pizza	86	107	+21	+ 24.4
Frozen Fish	251	203	−48	− 19.1
Frozen Potatoes	141	89	−52	− 36.9
Frozen Reg. Dinners	48	41	− 7	− 14.6
Frozen Mexican Food	48	110	+62	+ 29.2
Frozen Corn	63	46	−17	− 27.0

Source: *SAMI*

Top-spending food companies

Overall, capital spending increased 6.6 percent last year. Here's what the top 50 firms did in FE's fourth annual survey.

The food industry's capital spending programs are showing much more zip than those of other American industries, although spending growth is far from exuberant. This is the main finding of this year's fourth annual *Food Engineering* survey of expenditures for new plants and equipment by major manufacturing firms, companies with dominant food-processing segments, and conglomerates with large food segments within their realms of operation.

Capital expenditures figures for the top 50 companies ranked here show a 6.6 percent increase in 1981 over 1980—from $5.1 billion to about $5.4 billion. The previous year, 1979, showed a total of $4.3 billion. The increase from 1970 to 1980 was a healthy 16.3 percent, or about 10 percent more than last year's increase.

With inflation factored in, however, 1981 capital spending programs appear to have held steady. Conservative as this may seem, capital spending in the food industry is robust compared to the rest of the economy. According to recent figures, business spending on plant and equipment adjusted for inflation has actually declined 3 percent from its peak in 1981. Lower interest rates will help in the months ahead, but unless the general economy improves—along with corporate cash flows—the doldrums in capital spending is likely to stretch out into 1983.

Will the food industry continue to outpace other major industries in capital spending? Last year was a good one for industry profits, which were up 10.9 percent compared with 1980, and sales were up 10.2 percent. Such strength should reach out through this year and next. As long as this is the case, food companies will spend on plant and equipment, while keeping a cautious eye on the economy as a whole.

The top 10 spenders in the industry expended $2.9-billion last year, or 53.7 percent of the total; in 1980 they spent $2.0-billion or 39.2 percent of the total for that year. As in the previous two years, Anheuser-Busch was the industry's top spending company, although its total investment dropped $169-million to $421-million.

Second place this year was taken by Archer-Daniels-Midland, which was 7th in 1981. This aggressive firm is investing heavily in cottonseed oil processing facilities. A. E. Staley leaped into 5th place from 19th the previous year. Staley is expanding its Morrisville, Pa., HFCS plant and purchased a large plant for the production of soluble soy protein concentrate.

Nabisco and Ralston Purina are also new to the top 10 segment of the list this year. Ralston is upgrading its tuna fleet and processing capabilities, while Nabisco is making heavy investments in its international facilities. FE

MEL SELIGSOHN, News Editor

All figures are in thousands-of-dollars

1 ANHEUSER-BUSCH
St. Louis, Mo.

	1981	1980	% Change
Capital Expenditures	**421,300**	**590,000**	**−28.6**
Net Sales	4,409,600	3,822,400	15.4
Net Earnings	217,400	171,800	26.6
Cash Dividends Paid	51,200	44,800	12.1

Tripled the capacity of the Los Angeles Brewery and continued modification of the Baldwinsville, N.Y. Brewery as part of a program to increase capacity from 54.5 million barrels to 70 million barrels by the mid-1980's.

2 ARCHER-DANIELS-MIDLAND
Decatur, Ill.

	1981	1980	% Change
Capital Expenditures	**368,206**	**186,461**	**97.9**
Net Sales	3,647,491	2,802,011	30.2
Net Earnings	175,981	115,958	51.8
Cash Dividends Paid	8,440	7,264	16.3

Expansion of wet corn milling capacity completed at Decatur, IL, Cedar Rapids, IA, and remodeled Peoria, IL plants; completion of new flour mill in Hudson, NY and expansion of Centennial Mills on the West Coast; new cottonseed refinery begun in Little Rock, AR; expanded capacity at Lincoln, NE processing plant.

**Food segments only*   ***FE estimate for food segments*

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DOL

Top-Spending Food Companies . . .

All figures are in thousands-of-dollars

3 COCA-COLA
Atlanta, Ga.

	1981	1980	% Change
Capital Expenditures	329,606	293,071	12.5
Net Sales	5,889,000	5,620,700	4.8
Net Earnings	481,000	422,100	14.1
Cash Dividends Paid	286,787	266,928	7.5

Capital expenditures went for the purchase of the Atlanta Coca-Cola Bottling Co., the construction of the Atlanta corporate office complex, major expansion of Taylor wine production facilities in California, and a new chilled juice plant completed in Paw Paw, Michigan.

4 PHILIP MORRIS
New York, N.Y.

	1981	1980	% Change
Capital Expenditures*	329,320	299,300	10.0
Net Sales**	3,269,000	2,939,770	12.9
Net Earnings**	114,000	133,836	−17.4
Cash Dividends Paid	250,000	199,500	25.2

New Miller Brewery in Trenton, Ohio, was completed last year, along with Seven-Up's plant in Houston, and new world headquarters in New York.

5 CPC INTERNATIONAL
Englewood Cliffs, N.J.

	1981	1980	% Change
Capital Expenditures	293,500	235,900	28.9
Net Sales	4,343,100	4,120,300	5.4
Net Earnings	218,400	197,400	10.6
Cash Dividends Paid	91,700	81,100	13.1

The company built the largest corn wet milling plant west of the Rockies at Stockton, Cal., and a similar plant was completed at Winston-Salem, N.C.

6 A. E. STALEY
Decatur, Ill.

	1981	1980	% Change
Capital Expenditures	271,303	82,884	277.3
Net Sales	2,006,196	1,655,992	21.1
Net Earnings	105,821	73,810	43.4
Cash Dividends Paid	19,772	16,069	23.0

Staley has completed the new 600 million pound capacity corn refining plant in Louden, Tenn., and has expanded production capacity at Lafayette, Ind., and Morrisville, Pa. corn refining plants. Construction of a soybean oil refinery in Des Moines, Iowa, and a sunflower seed processing plant in Velva, N.D. has begun. The company has also increased capacity at the Decatur, Ill. soybean oil refinery.

Ranking of Top-Spenders

Company	1981	1980	1979
Anheuser-Busch	1	1	1
Archer-Daniels-Midland	2	7	33
Coca-Cola	3	4	3
Philip Morris*	4	3	4
CPC International	5	5	11
A.E. Staley	6	19	36
Pepsico*	7	2	2
Nabisco*	8	17	22
Ralston Purina	9	20	5
General Foods	10	6	12
Beatrice Foods*	11	8	7
Consolidated Foods	12	9	14
Adolph Coors	13	14	—
Kellogg	14	12	21
Quaker Oats	15	25	40
Campbell Soup	16	10	9
H.J. Heinz	17	16	13
Dart & Kraft*	18	11	16
General Mills*	19	22	10
Hershey Foods	20	28	29
R.J. Reynolds*	21	18	25
George A. Hormel	22	31	42
Carnation	23	49	20
Seagram*	24	26	34
United Brands	25	33	31
ITT*	26	29	28
Heublein	27	23	26
Pillsbury*	28	32	6
Borden*	29	27	8
Procter & Gamble*	30	21	15
Campbell Taggart	31	35	30
Anderson Clayton	32	41	37
Pabst	33	44	45
IC Industries*	34	41	41
G. Heileman Brewing	35	37	—
Warner-Lambert*	36	36	—
Norton Simon	37	34	23
Conagra	38	42	—
Central Soya	39	—	39
Castle & Cooke	40	40	27
Foremost-McKesson*	41	45	38
Gerber	42	50	17
Tyson Foods	43	—	—
International Multifoods	44	46	47
Dr Pepper	45	47	—
The Federal Co.	46	39	43
Wm Wrigley	47	48	44
Stokely-Van Camp	48	—	—
Greyhound	49	13	18
Universal Foods*	50	—	—

**Food segments only* ***FE estimate for food segments*

(continued on next page)

TED STATES OF AME

Top-Spending Food Companies . . .

All figures are in thousands-of-dollars

7

PEPSICO
Purchase, N.Y.

	1981	1980	% Change
Capital Expenditures*	268,500	316,500	−15.2
Net Sales*	4,950,300	4,198,400	18.1
Net Earnings*	570,400	529,500	7.8
Cash Dividends Paid	129,944	144,886	13.0

Opened 21 new beverage plants internationally. Began construction of a beverage plant in Colonie, N.Y. and new Frito-Lay plants in Casa Grande, Ariz. and Fort Bend County, Texas.

8

NABISCO
New York, N.Y.

	1981	1980	% Change
Capital Expenditures*	216,100	182,900	18.2
Net Sales	5,819,200	5,587,200	4.2
Net Earnings	266,300	234,800	13.4
Cash Dividends Paid	96,300	98,000	−2.4

Capital expenditures were for construction of a cream and milk plant in Itaperuna, Brazil, acquisition of a dessert and drink mix production plant in Vincente Lopez, Argentina, and a bakery goods warehouse in Chicago, Ill. Automated equipment was placed in the Atlanta bakery and distribution center and the Fair Lawn, N.J. distribution center.

9

RALSTON PURINA
St. Louis, Mo.

	1981	1980	% Change
Capital Expenditures	189,100	203,400	−7.0
Net Sales	5,224,700	4,873,200	7.0
Net Earnings	174,800	163,000	7.0
Cash Dividends Paid	77,700	69,100	12.0

Firm's major C.E. program was $89-million for purchase of tuna boats for Van Camp segment and upgrading of tuna processing facilities.

10

GENERAL FOODS
White Plains, N.Y.

	1981	1980	% Change
Capital Expenditures	186,900	154,700	20.8
Net Sales	6,601,300	5,959,600	10.8
Net Earnings	255,400	255,800	−0.2
Cash Dividends Paid	109,306	97,413	12.4

GF started construction of a new headquarters building in Rye, N.Y., and began a Jell-O Pudding Pops plant and decaffeinated coffee process improvements.

11

BEATRICE FOODS
Chicago, Ill.

	1981	1980	% Change
Capital Expenditures*	177,000	154,000	15.0
Net Sales*	6,632,000	6,052,699	10.0
Net Earnings*	478,417	439,169	9.0
Cash Dividends Paid	143,455	132,881	8.0

For the most part, capital expenditures were directed at improving productivity and efficiency, although expansion into new geographic areas also was a factor.

12

CONSOLIDATED FOODS
Chicago, Ill.

	1981	1980	% Change
Capital Expenditures	169,055	159,152	6.2
Net Sales	5,614,052	5,342,860	5.1
Net Earnings	140,278	127,682	9.9
Cash Dividends Paid	58,911	56,294	4.8

Opened a Douwe Egbert coffee production plant at St. Etienne, France and a new Chef Pierre frozen pie plant in Forest, Miss. Began construction on a Hollywood Brands candy plant in Centralia, Ill.

13

ADOLPH COORS
Golden, Colo.

	1981	1980	% Change
Capital Expenditures	156,157	111,099	40.5
Net Sales	929,916	887,897	4.7
Net Earnings	51,970	64,977	−20.0
Cash Dividends Paid	10,503	9,632	9.0

Major projects in 1981 included continuing construction of new malthouses, waste treatment facilities, a five-story office building and expansion of beer aging capacity.

14

KELLOGG
Battle Creek, Mich.

	1981	1980	% Change
Capital Expenditures	146,400	122,900	19.0
Net Sales	2,321,300	2,150,900	8.0
Net Earnings	205,400	184,400	12.0
Cash Dividends Paid	108,900	102,400	6.4

Construction of a corporate advanced technology facility in Battle Creek, Mich. was completed. Expanded operations and production capacity at the Lancaster, Pa. plant. Expanding frozen food production, distribution and warehouse facilities for Mrs. Smith's at McMinnville, Oregon and San Jose, Calif.

**Food segments only* ***FE estimate for food segments*

15 QUAKER OATS
Chicago, Ill.

	1981	1980	% Change
Capital Expenditures	136,400	112,400	21.3
Net Sales	2,599,500	2,405,200	8.1
Net Earnings	105,200	96,400	9.1
Cash Dividends Paid	36,500	32,800	11.3

Capital expenditures were for a new food and mixes production plant in Danville, Ill., a hot cereals manufacturing plant in Taipei, China and a pet food manufacturing facility near St. Etienne, France.

16 CAMPBELL SOUP
Camden, N.J.

	1981	1980	% Change
Capital Expenditures	135,402	97,391	39.2
Net Sales	2,797,663	2,560,569	9.2
Net Earnings	129,717	121,655	6.9
Cash Dividends Paid	66,298	61,479	7.8

Campbell's huge (250,000 sq ft) new processing facility and distribution center in Maxton, N.C., accounts for a huge chunk of the expenditures.

17 H.J. HEINZ
Pittsburgh, Pa.

	1981	1980	% Change
Capital Expenditures	128,604	98,061	31.2
Net Sales	3,568,889	2,924,774	22.0
Net Earnings	160,827	131,497	17.2
Cash Dividends Paid	58,841	48,131	22.3

Heinz expanded ketchup and barbecue sauce production capacities at Muscatine, Iowa and Fremont, Ohio. Capacity at the Ore-Ida potato factory in Plover, Wisconsin was doubled. New tuna canning equipment was installed at Terminal Island, Calif. for Star-Kist. A 1,200-ton cucumber-brining facility was opened in Portugal and a new food products plant opened in Utsunomiya, Japan.

18 DART & KRAFT
Glenview, Ill.

	1981	1980	% Change
Capital Expenditures*	125,400	155,000	−19.1
Net Sales*	7,067,900	6,846,500	3.2
Net Earnings	450,300	407,300	10.6
Cash Dividends Paid	185,300	150,300	23.3

Approximately two-thirds of the capital expenditures were for improved efficiency and replacement of existing facilities; and one-third for expansion.

19 GENERAL MILLS
Minneapolis, Minn.

	1981	1980	% Change
Capital Expenditures*	95,700	80,600	19.0
Net Sales*	2,514,600	2,218,800	58.0
Net Earnings*	217,700	210,500	3.0
Cash Dividends Paid	72,300	64,400	12.0

A new Tom's snack plant was opened in Perry, Fla., and one in Knoxville, Tenn., is underway. The company's overseas operations are being developed rapidly.

20 HERSHEY FOODS
Hershey, Pa.

	1981	1980	% Change
Capital Expenditures	91,673	59,029	55.0
Net Sales	1,451,151	1,335,289	9.0
Net Earnings	80,362	62,055	30.0
Cash Dividends Paid	25,504	21,240	20.0

The firm's new confectionary plant in Virginia is its major capital project with a total cost of about $126-million.

21 R.J. REYNOLDS
Winston-Salem, N.C.

	1981	1980	% Change
Capital Expenditures*	90,200	82,800	8.9
Net Sales*	2,334,100	2,108,600	11.0
Net Earnings	100,000	90,100	11.0
Cash Dividends Paid	290,200	254,508	14.0

Capital expenditures were used principally for the maintenance and improvement of processing facilities.

22 GEORGE A. HORMEL
Austin, Tex.

	1981	1980	% Change
Capital Expenditures	82,522	55,669	49.0
Net Sales	1,433,966	1,321,966	8.5
Net Earnings	27,283	32,758	−16.7
Cash Dividends Paid	8,838	8,069	9.5

With the highest C.E. in the firm's history, Hormel opened a one million square foot slaughtering, processing and distribution facility in Austin, Minn. The company also opened a new distribution facility in Hayward, Calif. and expanded the distribution facility in Dallas. Extensive remodeling was done at the Los Angeles manufacturing plant.

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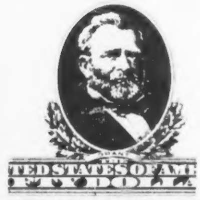
*Food segments only **FE estimate for food segments

(continued on next page)



Top-Spending Food Companies . . .

All figures are in thousands-of-dollars

23 CARNATION
Los Angeles, Cal.

	1981	1980	% Change
Capital Expenditures	79,542	73,057	8.8
Net Sales	3,354,141	3,236,222	3.6
Net Earnings	172,277	151,931	13.4
Cash Dividends Paid	67,056	61,864	9.0

In the U.S., pet food, milk and instant products were emphasized in the C.E. program; 16% of the 1981 total was expended overseas. Pet food plant capacity was expanded at the Jefferson, Wisc. and St. Joseph, Missouri plants.

24 SEAGRAM
Montreal

	1981	1980	% Change
Capital Expenditures*	78,000	65,000	17.0
Net Sales*	2,772,700	2,535,000	9.4
Net Earnings*	273,600	239,700	9.0
Cash Dividends Paid	46,477	37,292	20.0

Company is building extensively in Japan and South America. The company is expanding Paul Masson's crushing and processing operations in the United States, opening a bottling hall in Scotland and a new winery in Brazil.

25 UNITED BRANDS
New York, N.Y.

	1981	1980	% Change
Capital Expenditures	71,230	47,198	51.1
Net Sales	4,058,387	3,762,580	7.9
Net Earnings	29,386	31,056	−5.4
Cash Dividends Paid	5,396	3,850	40.2

The company is consolidating its John Morrell meat division plants into fewer, more efficient units. United Brands has completed the largest cold storage and ripening facility in the Middle East. Morrell's East St. Louis facility has been converted from slaughtering and processing to distribution only, and the Arkansas City processed meat plant has been expanded.

26 ITT
New York, N.Y.

	1981	1980	% Change
Capital Expenditures*	64,000	58,000	10.3
Net Sales*	1,739,000	1,816,000	−4.2
Net Earnings*	31,000	16,000	32.6
Cash Dividends Paid	207,025	167,846	23.3

Construction of bakery products plants in Hodgkins, Ill., and Ogden, Utah continues for Continental Baking Co.

27 HEUBLEIN
Farmington, Conn.

	1981	1980	% Change
Capital Expenditures	63,984	73,554	−13.0
Net Sales	2,050,121	1,921,879	6.7
Net Earnings	88,379	77,411	14.2
Cash Dividends Paid	38,036	34,566	10.0

Capital expenditures went towards the completion of the expansion of California wine facilities and new Kentucky Fried Chicken stores.

28 PILLSBURY
Minneapolis, Minn.

	1981	1980	% Change
Capital Expenditures*	60,900	52,400	13.9
Net Sales*	1,599,800	1,490,500	6.8
Net Earnings*	127,800	88,200	31.0
Cash Dividends Paid	38,700	33,500	13.2

Major investments were made to expand commodity handling, rice milling and improve flour milling productivity. R + D has been expanded greatly in the past several years.

29 BORDEN
New York, N.Y.

	1981	1980	% Change
Capital Expenditures*	46,914	48,777	−5.6
Net Sales	4,415,174	4,595,795	−3.9
Net Earnings	159,939	147,485	8.4
Cash Dividends Paid	59,110	57,976	2.0

Firm opened a new snack food plant in Spartanburg, S.C., completed a $6 million expansion of a hamburger bun line in Germany and completed a new production line at Creamettes plant in Minneapolis, Minn.

30 PROCTER & GAMBLE
Cincinnati, Ohio

	1981	1980	% Change
Capital Expenditures*	44,000	81,000	−45.6
Net Sales*	2,192,000	2,313,000	−5.2
Net Earnings**	44,000	44,000	—
Cash Dividends Paid	314,000	281,000	11.7

Company is planning higher levels of C.E. in the future, i.e. a new Folger's vacuum and instant coffee plant in New Orleans.

---

*Food segments only   **FE estimate for food segments

31 CAMPBELL TAGGART
Dallas, Texas

	1981	1980	% Change
Capital Expenditures	43,429	45,732	−5.0
Net Sales	1,257,514	1,113,147	13.0
Net Earnings	41,684	36,247	15.0
Cash Dividends Paid	14,828	13,311	11.0

Machinery and equipment accounted for about $25 million of the capital expenditures; about $9 million was spent for land and buildings; and about $9 million for transportation vehicles.

32 ANDERSON CLAYTON
Houston, Texas

	1981	1980	% Change
Capital Expenditures	41,438	30,310	24.0
Net Sales	1,929,647	1,703,102	13.3
Net Earnings	51,399	52,749	−2.6
Cash Dividends Paid	14,927	14,651	1.8

C.E.'s are at an all-time high for firm. Expenditures went for increasing production volume, cost reductions and equipment replacement.

33 PABST
Milwaukee, Wisc.

	1981	1980	% Change
Capital Expenditures	40,569	28,574	42.9
Net Sales	811,523	853,441	−4.9
Net Earnings	(13,206)	21,423	−161.6
Cash Dividends Paid	3,273	3,269	—

Capital expenditures includes properties acquired under capital leases.

34 IC INDUSTRIES
Chicago, Ill.

	1981	1980	% Change
Capital Expenditures*	37,800	33,000	14.5
Net Sales*	1,545,000	1,504,100	2.7
Net Earnings**	43,000	34,400	20.0
Cash Dividends Paid	58,700	55,200	6.3

Major increases in plant investment were made at Pet facilities around the country. Whitman has undertaken a multi-year project to expand capacity.

35 G. HEILEMAN BREWING
La Cross, Wisc.

	1981	1980	% Change
Capital Expenditures	37,493	38,724	−3.2
Net Sales	931,940	840,784	10.8
Net Earnings	40,230	34,683	16.0
Cash Dividends Paid	9,164	7,664	18.0

Major projects include increasing capacity and environmental projects at La Cross, Wisc.

36 WARNER-LAMBERT
Morris Plains, N.J.

	1981	1980	% Change
Capital Expenditures*	36,000	41,000	−12.0
Net Sales*	1,001,000	903,000	11.0
Net Earnings**	80,600	75,764	6.0
Cash Dividends Paid	106,759	105,142	1.5

The company opened a chewing gum plant in Egypt and expanded production in Portugal. Entenmann's bakery production capacity was expanded.

37 NORTON-SIMON
New York, N.Y.

	1981	1980	% Change
Capital Expenditures*	35,966	45,891	−21.4
Net Sales*	1,418,000	1,416,800	0.1
Net Earnings*	127,500	113,400	12.4
Cash Dividends Paid	48,092	51,462	−6.5

Capital expenditures went for cost reduction and energy conservation programs.

38 CONAGRA
Omaha, Neb.

	1981	1980	% Change
Capital Expenditures	35,893	30,344	18.2
Net Sales	1,376,808	842,905	63.0
Net Earnings	27,071	16,515	46.0
Cash Dividends Paid	9,237	7,730	32.5

Company plans to expand flour milling operations in four operations.

**Food segments only* ***FE estimate for food segments*

(continued on next page)

Top-Spending Food Companies . . .

All figures are in thousands-of-dollars

39 CENTRAL SOYA
Fort Wayne, Ind.

	1981	1980	% Change
Capital Expenditures	35,157	41,162	−14.6
Net Sales	1,975,042	1,744,445	13.2
Net Earnings	19,901	34,758	−42.8
Cash Dividends Paid	12,768	12,284	4.0

Company completed modernizing domestic soybean processing operation in Decatur, Ill.

40 CASTLE & COOKE
Honolulu

	1981	1980	% Change
Capital Expenditures	34,565	40,000	13.7
Net Sales	1,794,915	1,676,000	1.0
Net Earnings	42,284	32,000	3.2
Cash Dividends Paid	20,280	19,500	4.0

Capital expenditures reached their peak in 1978 at $117 and have declined to a level which approximates depreciation.

41 FOREMOST-MCKESSON
San Francisco, Calif.

	1981	1980	% Change
Capital Expenditures*	32,238	31,057	3.8
Net Sales*	1,833,249	1,689,715	8.0
Net Earnings*	75,429	62,365	21.0
Cash Dividends Paid	32,400	26,360	23.0

Capital expenditures went for the expansion of the bottled water business and the opening of a pasta research laboratory in Dublin, California.

42 GERBER
Fremont, Mich.

	1981	1980	% Change
Capital Expenditures	28,755	22,075	30.3
Net Sales	631,017	601,988	4.8
Net Earnings	30,843	29,716	12.3
Cash Dividends Paid	15,492	13,852	11.8

C.E. mainly for renewal and replacements in food manufacturing facilities.

43 TYSON FOODS
Oklahoma City, Okla.

	1981	1980	% Change
Capital Expenditures	25,321	8,938	183.3
Net Sales	501,716	390,318	28.5
Net Earnings	1,340	592	128.0
Cash Dividends Paid	616	616	—

In addition to several acquisitions, company converted its Cumming, Ga., dri-pak processing plant into a Tyson Country Fresh chill-pak plant, and completed construction of a new feed mill in Nashville, Ark.

44 INTERNATIONAL MULTI-FOODS
Minneapolis, Minn.

	1981	1980	% Change
Capital Expenditures	23,178	23,634	−2.0
Net Sales	1,147,659	1,088,110	5.0
Net Earnings	33,153	27,203	22.0
Cash Dividends Paid	11,625	10,385	12.0

Plant capacity is being increased at a Venezuela flour mill and a Canadian bakery mix plant. Increased durum milling capacity in St. Paul, Minn.

45 DR PEPPER
Dallas, Texas

	1981	1980	% Change
Capital Expenditures	22,994	24,757	−7.1
Net Sales	363,966	333,165	9.2
Net Earnings	29,398	26,543	10.8
Cash Dividends Paid	15,772	14,545	8.4

Major project was work on the company's new production and distribution facility in Houston, Tex. Opened a Canada Dry bottling plant in Lagos, Nigeria.

46 THE FEDERAL CO.
Memphis, Tenn.

	1981	1980	% Change
Capital Expenditures	19,850	35,061	−43.4
Net Sales	1,104,878	977,849	13.0
Net Earnings	20,121	9,653	108.4
Cash Dividends Paid	10,427	9,758	6.9

A major project was the completion of National Byproducts renovation of its Little Rock, Ark. facility.

**Food segments only   **FE estimate for food segments*

47 WM. WRIGLEY
Chicago, Ill.

	1981	1980	% Change
Capital Expenditures	19,400	22,807	−14.9
Net Sales	607,834	557,632	9.0
Net Earnings	28,431	30,689	−7.4
Cash Dividends Paid	17,638	16,456	7.3

Capital expenditures went for normal replacement and modernization of existing equipment.

48 STOKELY-VAN CAMP
Indianapolis, Ind.

	1981	1980	% Change
Capital Expenditures	16,953	21,305	−25.3
Net Sales	564,956	541,528	4.0
Net Earnings	9,031	11,431	−21.0
Cash Dividends Paid	5,603	6,074	−7.7

Company is expanding vegetable oil refinery in Kearney, N.J.

49 GREYHOUND
Phoenix, Ariz.

	1981	1980	% Change
Capital Expenditures*	16,395	12,941	26.7
Net Sales*	2,302,241	2,464,414	−6.6
Net Earnings*	9,006,000	(4,396)	269.3
Cash Dividends Paid	54,136	53,171	2.0

Capital expenditures have been reduced to some extent by obtaining equipment and other property under operating leases.

50 UNIVERSAL FOODS
Milwaukee, Wis.

	1981	1980	% Change
Capital Expenditures*	15,331	10,956	39.9
Net Sales*	435,776	380,242	14.6
Net Earnings*	39,403	30,712	28.3
Cash Dividends Paid	6,714	6,489	3.5

Company funded major expansion of yeast plant production capacity at Milwaukee and Belle Chasse, La. Ongoing expansion for Cedar Rapids, Iowa bottling facility and the Livingston, Calif. onion and garlic plant.

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*Food segments only **FE estimate for food segments

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COVER STORY: Food Engineering's salary survey is based on more than 1,500 completed questionnaires from all segments of the food industry . . . and from all levels of management.

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MICROWAVE CAKE MIX: Procter & Gamble developed this cake mix exclusively for microwave ovens. Product formulation has been modified, along with baking and frosting instructions.

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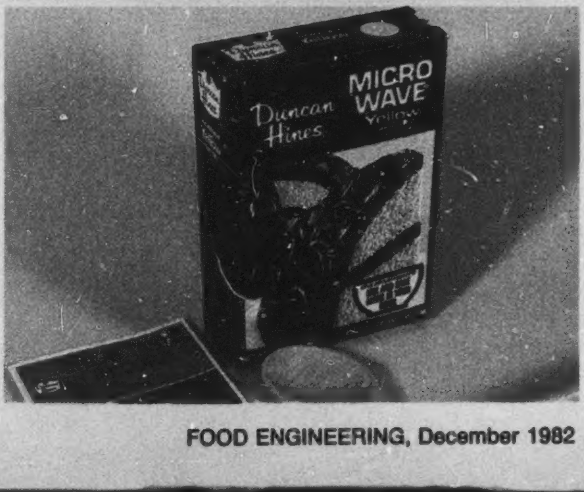

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RAPID LAB TESTS: Automated analytical systems at Kellogg's improve quality control, reduce costs, and speed throughput.

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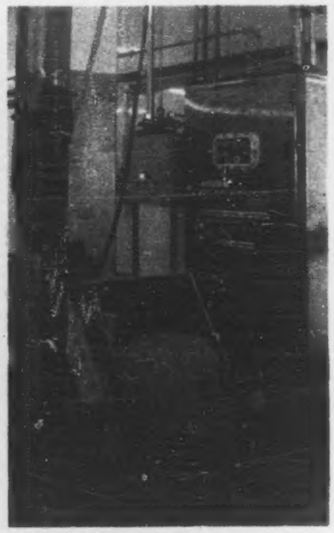

NEW FREEZER: Two-stage freezing system features "revolutionary" defroster technology. First installation in the U.S. is at Bellingham Frozen Foods.

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ASEPTIC BAG-IN-BOX: Del Monte ships 300 gallons of pineapple juice concentrate in this aseptic bag-in-box system.

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1982 Salary Survey

Here's what over 1,500 of you reported to us about salaries for 1982 . . . and your comments.

The average (median) salary for all types of "managers" in the food industry for 1982 was $33,760. That is 16.4% higher than the salaries reported two years ago in *Food Engineering's* survey which was published in December 1980.

This year's survey was conducted during October 1982, when 6,000 questionnaires were mailed to a cross-section of personnel employed by food manufacturing firms. By November 1, the cut-off date, 1,528 questionnaires were completed and returned to *Food Enginnering*. The information published here is a tabulation of those questionnaires.

Vice Presidents of Research and Development topped the list with a median salary of $66,000. That is $10,000 higher than the median salary for Vice Presidents of Manufacturing, and $10,200 higher than the median salary for Vice Presidents of Marketing and Sales.

One reason for the higher salaries of Vice Presidents of R&D is personnel with that position tend to have a Ph.D. And Ph.D's reported salaries about 23% higher than personnel with Bachelors degrees, and 21% higher than personnel with Masters degrees. Data pertaining to salaries and educational

(Continued on next page)

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experience is published in a table elsewhere in this article.

Salaries of presidents

Unfortunately, only a few presidents of large food companies (500 or more employees) responded to the survey, thus distorting the results in favor of small companies (under 100 employees). Since those results would be more misleading than helpful, they are not published here.

However, other surveys by other organizations provide a good look at salaries and compensation of presidents of food companies. For example, Arthur Young & Company (New York City) reports that in 1981 chief executive officers of "food products companies at all levels of sales volume in bonus-paying companies" were paid an average of $325,400. Chief *operating* officers of food products companies earned average compensation of $276,000.

Whenever results of executive compensation are published, the six-figure salaries raise a few eyebrows. As one respondent to *Food Engineering's* survey commented, "I would like to complain about the enormous bonus taken by the President of our Corporation. It amounted to $130,000 in common stock and was taken the same year all salaried personnel in our Division were asked to abide by the 7% ceiling on wage adjustments. Furthermore, our wage review period was extended to 13 months from the normal 12."

On the other hand, a different perspective about salaries of presidents is provided by Towers, Perrin, Forster & Crosby, management consultants. "The fuss and furor about chief executive pay is nonsense," asserts C. F. Fretz, Vice President of Human Resource Services for TPF&C. "We ask these individuals (top executives) to take on responsibility for millions, sometimes billions of dollars in shareholder investments and the future of thousands of working people. We cannot expect them to do that without adequate reward. If anything, most CEOs in this country are underpaid."

Small companies vs. large

Do large companies pay higher salaries than small companies? In general, the answer is yes. Or at least large companies offer the opportunity for larger salaries to be earned. The median salary for all managers in large companies (over 500 employees) is $37,000 which is about $5,000 higher than the median salaries for managers in companies with under 500 employees. This is due, of course, to managers in large companies having more people and facilities to manage, thus higher salaries.

For example, technical directors of large companies (over 500 employees) have a median salary of $52,000. That contrasts with a median salary of around $37,000 for technical directors of companies with 100-499 employees.

However, there are three job titles—sales manager, food technologist, and sanitation/maintenance manager—where the salary gap is not as wide between small companies and large. For these positions, the median salary difference is between $3,000-$4,000. Percentage wise that represents a gap of about 15%, whereas the gap for technical directors is more like 40%.

That's not to say that all small companies pay low salaries. In some cases, smaller companies are making it quite attractive for personnel to stay—especially manufacturing and marketing executives.

Product specialties

Does one branch of the food industry pay better than another? Are salaries higher in the dairy industry than in the meat industry? Do bakeries pay more than soft drink companies? And so on.

Actually, most food companies are diversified into more than one type of product, so questions like that are becoming academic. Nevertheless, in

Range Of Salaries By Job Function

The numbers indicate the percentage of respondents in each salary range, by job function. For example, 10.5% of the Vice Presidents of R&D reported a salary within the range of $35,000-$39,999.

	Vice President, R&D	Vice President, Manufacturing	Vice President, Marketing/Sales	Engineering Manager	Technical Director	Sales Manager	Marketing Manager
Under $10,000	—	—	—	—	—	—	—
10,000-14,999	—	—	—	—	—	1.3	—
15,000-19,999	—	—	—	1.6	2.5	—	1.8
20,000-24,999	—	2.0	4.3	—	7.5	3.9	5.3
25,000-29,999	—	4.0	4.3	4.8	12.5	11.8	14.0
30,000-34,999	—	—	8.7	11.1	13.8	14.5	15.8
35,000-39,999	10.5	6.0	10.9	22.2	12.5	19.7	21.1
40,000-44,999	15.8	16.0	8.7	27.0	20.0	26.3	14.0
45,000-49,999	5.3	4.0	—	3.2	1.3	2.6	3.5
50,000-54,999	5.3	16.0	10.9	17.5	10.0	11.8	15.8
55,000-59,999	5.3	12.0	13.0	6.3	8.8	5.3	5.3
60,000-69,999	15.8	22.0	13.0	3.2	5.0	2.6	3.5
70,000-79,999	10.5	6.0	4.3	1.6	3.8	—	—
80,000-99,999	5.3	8.0	15.2	1.6	2.5	—	—
Over $100,000	26.3	4.0	6.5	—	—	—	—

Average (Median) Salaries By Job Function

Vice President, R&D	$66,000
Vice President, Manufacturing	56,000
Vice President, Marketing/Sales	55,800
Engineering Manager	41,650
Technical Director	40,380
Sales Manager	39,000
Marketing Manager	37,670
Plant Manager	37,560
Packaging Manager	37,330
Project Engineer	32,970
Transportation/ Distribution Manager	31,930
Purchasing Manager	31,370
Sanitation/ Maintenance Manager	29,500
Quality Control Manager	27,910
Chemist	27,890
Production Supervisor	27,440
Food Technologist	26,600

sifting through the data and separating salaries by primary product, the higher salaries appear to be associated with the beverage and baking areas. This was true in *Food Engineering's* survey in 1980, too.

This year, for personnel employed by companies specializing in grain mill products, the median salary was $36,000. Personnel employed in the beverage industry had a median salary of $35,920. And bakery employees reported a median salary of $35,470. At the bottom of the list were dairies ($31,790), fruits & vegetables ($31,600) and seafood ($28,200).

Personnel who listed two or more "primary" products as their specialty, has a median salary of $35,490. This is $1,730 more than the median salary for everyone combined.

Low salaries

Once again this year there were numerous comments about low salaries in the food industry. And it wasn't only the people on the receiving end of the low salaries that complained. As one Vice President of R&D (earning over $100,000 per year) stated: "The food industry will not improve its profit margins unless they pay competitive salaries to attract outstanding people. Paying low salaries because we have low margins just insures we'll stay poor."

About half of the complaints about low salaries came from quality control managers, food technologists and chemists. Also high on the list of complaintants were transportation managers. After those four groups, the comments about low salaries were spread fairly evenly throught the spectrum of job titles.

The most frequent complaint from technical people was that they are being paid less than non-technical employees. One food technologist with 6-9 years of experience in the meat industry reported: "Non-exempt and hourly workers working comparative hours will earn in excess of my salary." A quality control manager with 6-9 years of experience in the fruit & vegetable industry said: "My salary is less than the packing floor supervisors." And those comments were echoed by a host of other food technologists and quality control managers.

One chemist brought out a secondary problem created by low salaries: "Companies have a tendency to underpay technical people . . . this tends to diminish the impact that the technical person should have."

Frequently, the comments mentioned unions. "Union wages are increasing at a more rapid rate than management," said one transportation manager. "I could go to work as a truck driver in my own department and make more money." In the same vein, a plant engineer commented, "Bargaining units have been doing well during the recession with 8-14% increases in pay. Management has been around 6-7%."

In any event, the overriding feeling

(Continued on next page)

Plant Manager	Packaging Manager	Project Engineer	Transportation/ Distribution Manager	Purchasing Manager	Sanitation/ Maintenance Manager	Quality Control Manager	Production Supervisor	Chemist	Food Technologist
—	—	—	—	—	—	—	—	—	—
—	—	—	2.1	1.8	—	2.2	2.2	2.1	1.9
1.6	1.1	1.6	4.2	10.9	2.2	9.4	10.0	10.6	17.1
7.8	7.9	4.9	16.7	15.5	19.6	21.0	20.0	23.4	23.8
10.9	15.7	22.1	17.4	16.4	28.3	24.3	30.0	21.3	19.0
17.2	18.0	29.5	20.8	17.3	30.4	16.6	15.6	21.3	15.2
20.3	13.5	19.7	13.2	11.8	13.0	12.7	10.0	8.5	10.5
15.6	25.8	16.4	11.1	10.0	4.3	8.3	7.8	2.1	8.6
3.9	1.1	0.8	1.4	3.6	—	1.1	—	2.1	—
10.9	5.6	4.1	7.6	7.3	—	2.2	2.2	8.5	1.9
3.1	6.7	0.8	1.4	3.6	2.2	1.7	—	—	1.0
3.9	3.4	—	2.8	0.9	—	0.6	1.1	—	—
3.1	1.1	—	1.4	0.9	—	—	1.1	—	1.0
—	—	—	—	—	—	—	—	—	—
1.6	—	—	—	—	—	—	—	—	—

1982 SALARY SURVEY . . .

about low pay for technical personnel was that companies should distribute the "rewards" more equitably in view of the training required to obtain the technical skills and the responsibility that goes with the job.

However, when it comes to responsibility, other groups such as marketing managers, purchasing managers and transportation managers, make good points. As one transportation director says: "When someone is responsible for negotiating rates and transportation contracts—and realizes a $6-10 million savings annually—he should command a higher salary."

Good benefits

Of course, not everyone commented negatively about salaries. Some people expressed satisfaction with their compensation, while others philosophized "no matter how much you make, it's never enough."

In addition, many people commented about the benefits provided by their companies "I have the feeling of more security and satisfaction when compared to other industries who are laying off and/or cutting salaries," said one engineer. This particular engineer reported 20 years of experience in the food industry and 5 years of experience outside the food industry. At least a dozen other comments referred to the "stability" of the food industry as a benefit.

Another benefit mentioned frequently was the rural nature of the industry. "We're satisfied with our environment, low population, clean air, and low crime rate," wrote one project manager. "We accept low salaries because of these advantages."

"Free food" was another benefit mentioned by a number of respondents. Although many of them just mentioned "free milk," "free bread," etc., one packaging engineer who works for a meat company put a price tag on it. "We receive $500-$700 worth of free products a year," he said.

Average (Median) Salaries By Company Size

	0-99 Employees	100-499 Employees	500 or more Employees
Vice President, R&D	$ —	$49,000	$100,000
Vice President, Manufacturing	49,000	53,330	67,880
Vice President, Marketing/Sales	43,000	54,500	69,000
Engineering Manager	—	37,250	42,670
Technical Director	28,000	36,670	52,000
Sales Manager	37,000	39,000	40,830
Marketing Manager	28,000	34,000	42,800
Plant Manager	35,400	37,440	43,600
Packaging Manager	24,500	32,000	40,220
Project Engineer	—	31,780	33,520
Transportation/Distribution Manager	26,600	27,330	37,000
Purchasing Manager	26,330	27,500	37,000
Sanitation/Maintenance Manager	29,500	28,000	32,500
Quality Control Manager	22,670	26,140	32,940
Production Supervisor	25,670	26,600	34,000
Chemist	18,500	28,000	31,000
Food Technologist	24,500	22,830	28,200

Company cars as a benefit were mentioned frequently, too. "We are compensated with car allowances, medical, life insurance, auto insurance, gasoline for our autos, paid vacations, extra check at vacation, free meat, profit sharing and yearly bonus, said one quality control manager. "In addition to my salary, I get a company car which is considered to be worth about $5,000 income," said another.

Male vs. female salaries

Is there discrimination in salaries between males and females doing similar work? Unfortunately, *Food Engineering's* survey didn't have a large enough response from females to permit detailed comparisons. A total of 112 females with the title of food technologist or quality control manager did return the survey. While that may seem like a large enough response, it doesn't permit detailed comparison of all the variables.

For example, the median female salary for quality control managers was $22,000. The median salary for males doing that job was $28,710. Quite a difference. But those medians are misleading unless you take experience into account.

From an experience standpoint, 63% of the male quality control managers had more than 10 years of job experience. Only 10% of the female quality control managers had more than 10 years of job experience. So when median salaries of the managers are compared, the comparison is skewed on the high side in favor of male managers with greater experience.

Of course, it is possible to separate the respondents by salary *and* job experience. And Food Engineering did that. But educational experience also enters the picture. One group may have more Ph.D's than the other. So you have to separate groups by educational level, too. Then, what about geographic location? And what about company size? What it all boils down to is that 112 respondents is not enough to provide a detailed, valid look at this particular aspect of salaries.

Raises are too small

Many experienced personnel within the food industry complained that raises have not kept pace with the increase in starting salaries offered to college graduates each year.

One chemist with over 20 years experience commented, "starting salaries in the food industry have increased so fast over the past 8-10 years, that new employees with the same education as long-time employees are making basically the same salary. There have been no adjustments within this company for experience and expertise."

An engineer with over 20 years experience summed it up this way: "Old timers are not adequately compensated commensurate with years of employment and experience compared to salaries offered to recent graduates."

Another engineer provided some details about the problem: "Engineering salary after 4 years is $28,000 (his salary). Starting salary (his) was $16,000. So 4 year increase has totaled 76%. Unfortunately, I read and hear via grapevine that salaries for recent graduates range from $23,000-$26,000. So my actual increase for 4 years is roughly 15%."

That's a problem that management has to address.

Salary cutbacks, freezes

While some people complained about raises being too small, others felt the sting even more, as indicated by the following comments:

"All salary levels within our parent company and subsidiaries are frozen until the company experiences two consecutive quarters of profit,"—quality control manager, beverage company.

"The company gave across-the-board pay *cuts* (6%) to middle management in 1980, and very small (5%) raises since,"—Purchasing manager, dairy.

"Our company has a freeze on wages,"—plant manager, dairy.

"There will be no pay increases for non-union employees this year,"—sales manager, bakery.

"Company salaries in management have been frozen going on one year. However, capital expenditures have risen sharply and union employees have had a good raise during the same time frame,"—purchasing manager, cannery.

"Our company laid off all food engineers and chemical engineers who were working on long range projects," reports the technical director of a large multi-products company. "Actions such as this will have a long-lasting effect on this company's future hiring of research engineers."

For a few individuals, there may be one way around the salary squeeze, as pointed out by this comment: "Once established as a credible consultant, my income became at least triple of what I would probably have received as an employee." The person who made that comment reported a salary level of "100,000 or more."

Salaries: "Forbidden issue"

Another interesting comment came from a "manager" on the East Coast: "Salaries in our company are a forbidden issue to discuss. Union personnel make no secret of hourly wage, overtime, pay differential or other compensation. However, management personnel have been indoctrinated in the belief that it is beneath their dignity to discuss salaries.

"I sincerely believe this type of thinking should be changed. It is to the company's interest to publish the salaries and bonuses of all management and executive personnel. The company would benefit from this, if compensation was fairly distributed, by higher moral and greater productivity because everyone would know the salary structure of the company. The underpaid, hard worker who has been with the company 10 or more years and does not know his real worth would rightly be increased to the prevailing wage."

Salaries vs. Product Specialties

Grain Mill Products	$36,000
Beverages	35,920
Bakery	35,470
Meat	33,380
Fats & Oils	33,380
Confectionery	32,750
Pasta	32,500
Dairy	31,790
Fruits & Vegetables	31,600
Seafood	28,200
Multiple Categories	35,490
Categories other than those mentioned above	35,920

Within each product specialty (Grain Mill Products, etc.), the salaries for all job functions from vice president through food technologist have been tabulated and the median salaries are presented here. If respondents checked two or more product specialties, they are listed under "multiple categories."

Geographical Location	Average (Median) Salary
New England	$32,470
Middle Atlantic	33,940
South Atlantic	32,920
Deep South	33,330
North Central	33,830
Plains States	28,400
Rocky Mountain	31,600
Southwest	33,540
West Coast	36,580

Educational Experience	Average (Median) Salary
High School, or less	$31,410
Some College	32,180
Bachelors degree	35,480
Masters degree	36,060
Ph.D	43,600

Foods advertised the most— and the least

According to this USDA study, breakfast cereals top the list in advertising-to-sales ratios.

As might be expected, advertising has a significant impact on food sales. According to a recent study by the USDA's Economic Research Service (ERS), product classes that are heavily advertised by brand manufacturers generally get a bigger share of the consumer dollar than less heavily promoted product classes. Without advertising at levels near the industry average advertising-to-sales ratios, food manufacturing firms are rarely able to maintain market shares of branded, packaged products.

According to industry data, the leading national advertisers in nearly every food processing industry are those which have the largest share of the market. ERS estimates that advertising accounted for about four percent of the at-home expenditures for food during the 1970's.

Nearly all food industry advertising and promotion is intended to influence consumers to make choices of what to buy or where to shop. There is virtually no advertising designed to increase total food consumption, or influence consumer choices between food and nonfood items. Moreover, there is very little advertising that promotes broad classes of food such as dairy, meat, and produce. This type of promotion, called generic or commodity advertising, is designed to influence consumer choice among food products, but it accounts for less than 1 percent of total food advertising and promotion expenditures.

Although most food advertising promotes a particular brand, such advertising may also increase purchases of all brands in the same product class. This may be partially due to longrun substitution of these aggressively advertised products for classes whose brands are individually and collectively little advertised (thus lowering consumers' awareness of their existence). Extensive advertising of one brand in such a product class could motivate consumers to try other brands as well to find the one that best satisfies their preferences. FE

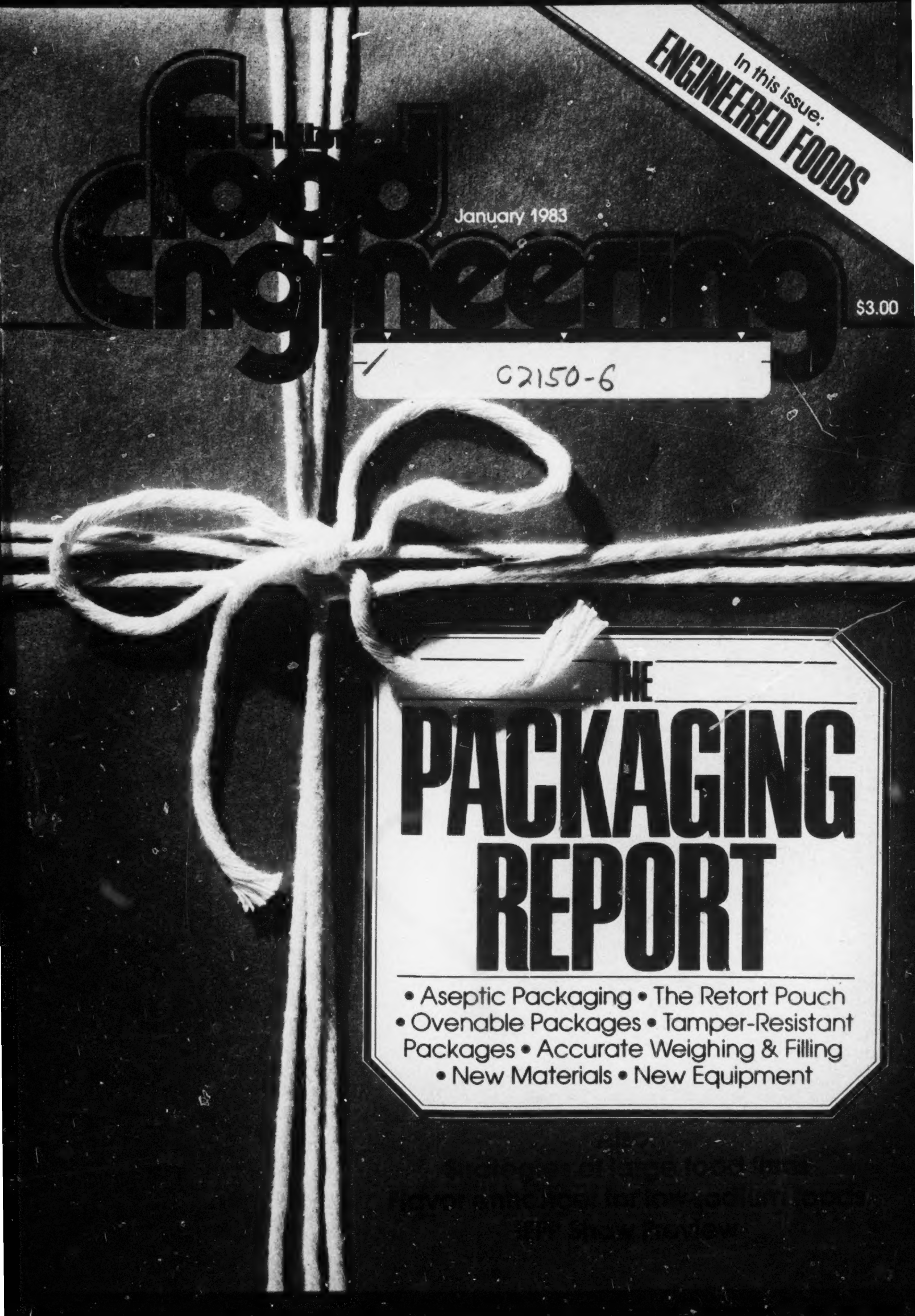
Adapted from "Advertising and American Food Consumption Patterns" by Anthony E. Gallo and John M. Connor in the Summer, 1982 issue of the National Food Review, ERS, USDA, Washington, D.C.

Foods with the highest advertising/sales ratio

Product category	A/S ratio
Breakfast cereals	10.10
Bottled liquors	8.82
Soup mixes	6.94
Dog and cat food	6.41
Ready to mix desserts	6.31
Meat sauces	5.41
Mayonnaise	5.02
Other flavorings	4.96
Wines, brandys, etc.	4.59
Cake mixes	4.55
Other food preparations	3.59
Tea	3.45
Frozen baked goods & dinners	3.30
Canned beer and ale	3.01
Catsup	2.89
Macaroni, spaghetti, noodles	2.83
Concentrated coffee	2.62
Margarine	2.75
Soups & other canned specialties	2.46
Sweeteners and syrups	2.43

Foods with the lowest advertising/sales ratio

Product category	A/S ratio
Frozen juices	0.59
Natural cheese	0.59
Ice cream & ices	0.57
Frozen packaged fish	0.55
Canned nuts	0.50
Canned vegetables	0.41
Turkeys	0.32
Corn mill products	0.27
Young chickens	0.23
Wheat mill products	0.22
Butter	0.15
Processed cheese	0.12
Ducks & small game	0.10
Wheat flour	0.09
Processed fish	0.07
Lard	0.02
Packaged fluid milk	0.02
Vinegar	0.02
Bird feed	0.01
Beef	0.00
Veal	0.00
Lamb	0.00
Pork	0.00
Packaged fish	0.00



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Food Engineering

January 1983

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THE PACKAGING REPORT

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- The Retort Pouch
- Ovenable Packages
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Chilton's Food Engineering

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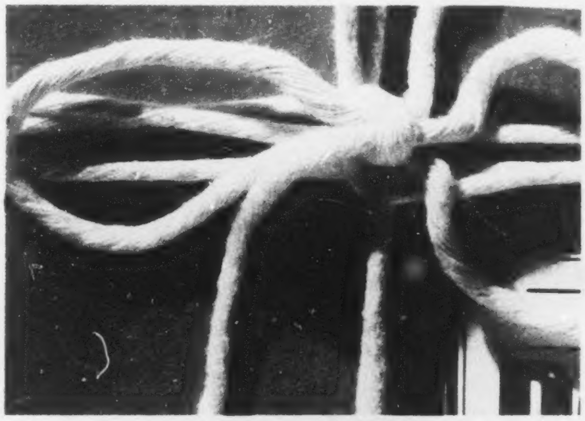
FE Highlights

THE PACKAGING REPORT: You name it and there probably was a new version of it at Pack Expo '82 in November. Here's a look at some of the developments and trends spotted by *Food Engineering's* editors. **PAGE 73**

GENERAL MILLS TRIES ASEPTIC: A line of aseptically-packaged juices in five flavors is being tested by General Mills under the "Nature Valley" brand. **PAGE 35**



Fruit-Squeeez
Fruit-Squeeez

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IN-LINE MIXER: The tough blending job of mixing tomato paste and water is handled beautifully with this motionless, in-line mixer.

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LOW SODIUM: A new yeast-based flavoring masks the bitterness of KC1 and allows sodium reductions of up to 90%.

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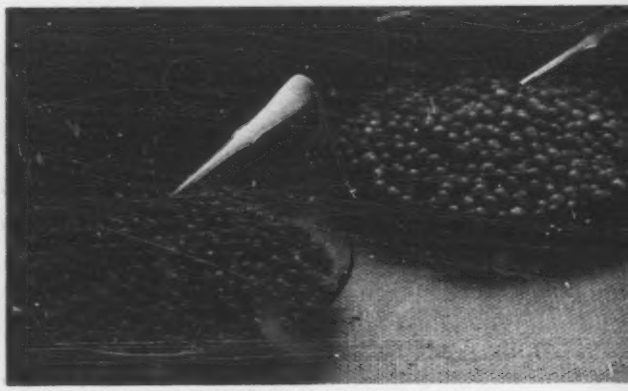

PEAS STAY GREENER IN NEW CAN: That fresh look for peas is retained throughout retorting and storage with a new interior coating for cans. It helps stabilize the chlorophyll in the product.

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FOOD ENGINEERING® (ISSN 0193-323X). January 1983, Vol. 55, No. 1. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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Events

USDA cites food choice changes

USDA has just completed tabulations on its 1977 Nationwide Food Consumption Survey. The agency says that, "Some of the changes in food consumption may reflect a concern about caloric intake," noting that there was a 30 percent decrease in consumption of whole milk, compared with a 341 percent increase in fluid skim and low-fat milk consumption.

USDA's Consumer Nutrition Center said in the report that consumers were eating a greater variety and quantity of fresh fruits and vegetables, juices, yogurt, nuts, and honey in 1977 than in 1965. There was also a decrease during the same period in consumption of fats and oils, bakery products, flour and cereals, and sugar and sweets.

Soft drink consumption, the study noted, increased from 23 ounces per person per week in 1965 to 31 ounces in 1977. Alcoholic beverage use also increased from 10 to 14 ounces per person per week. Data in the accompanying chart is drawn from the USDA survey.

The 296-page report, "Food Consumption: Households in the United States, Spring 1977, Nationwide Food Consumption Survey 1977-78, Report No. 1," stock number 001-000-04293-9, is for sale for $8.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Processors urged to market overseas

Chairman of the House Agriculture Committee, Kika de la Garza (D-Tex.), is urging aggressive marketing efforts by private American food processors and producers if they wish to play an increasing role in developing the world market for farm products.

De la Garza's comments came after his visit to the 10th International Food Products Exposition in Paris, a food promotion forum which was the largest food trade show in Europe this year. Many of the U.S. participants were showing and pushing for sales of "high value" products including processing foods, fruits, vegetables and fish. The fish products included farm-raised catfish.

"Of course, it is important to continue to campaign to expand exports of basic products like corn, soybeans cotton and other crops which bring our farmers billions of dolars each year. But there is also a big potential market in many countries for a wide variety of ready-to-use foods like meat and poultry products, fruits vegetables and convenience foods. Our country should be getting its fair share of that market, and what I found in Paris indicates that American producers and processors intend to go after that fair share," de la Garza said.

The Agriculture Committee Chairman said the U.S. government should encourage more progress in exports of high value foods along with its efforts to expand basic crop exports. He said, "Anything we can do to expand total exports is helpful in our effort to bring farm income up from the current depressed level."

De la Garza met in Paris with European officials and with French private food industry leaders, and urged them to work toward compromise solutions for current trade disputes between the U.S. and the European Common Market.

"We face some extremely serious issues, including the questions of Common Market export subsidies and their impact on American producers in world markets. It will be to everyone's benefit if we can get fair solutions to these problems without a trade war which might hurt everybody," de la Garza said.

What are Americans eating?

Food item	Quantity per person per week in 1977 (pounds)	Change from 1965 (percent)
Increased use:		
Yogurt	0.081	+440
Skim, lowfat milk	1.712	+341
Frozen fruit, fresh fruit juice	.265	+ 91
Turkey	.094	+ 81
Nuts (shelled-weight)	.046	+ 44
Alcoholic beverages	.952	+ 40
Soft drinks	2.133	+ 38
Breakfast cereal, cold	.327	+ 36
Fruit ades, punches, drinks	.410	+ 33
Decreased use:		
Evaporated milk	.073	− 61
Butter	.061	− 52
Shortening	.096	− 47
Coffee	.134	− 41
Canned fruit	.283	− 41
Nonfat dry milk	.026	− 35
Flour	.315	− 34
Breakfast cereal, hot	.057	− 32
Dried fruit	.022	− 27
Sugar	.521	− 26
Jelly, jam	.102	− 26
Bread	.992	− 25
Potatoes, white, fresh	1.081	− 25

Data is drawn from a recently released USDA food consumption survey, with a comparison with data from a similar survey 12 years earlier.

Food prices to ease in '83

USDA sees lower food price inflation in 1983. Food prices last year were up only 4.5 percent—the smallest annual gain since 1976—but the news next year may be even better. Abundant supplies of farm products, stagnant consumer incomes and moderating costs of processing and marketing food have helped slow the annual price increases since 1979, says the agency.

"A similar situation should prevail next year. The general inflation rate is likely to slow further, limiting the rise in food processing and distribution costs. On the whole, larger food supplies will tend to offset somewhat stronger demand by consumers as the economy improves," says Deputy Assistant Secretary J. Dawson Ahalt. "Thus, overall retail food prices are likely to increase in the range of 3 to 6 percent."

Ahalt made his comments at USDA's recent annual outlook conference. "Next year is expected to be an-

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Food Packaging

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February 1983

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SPECIAL REPORT

1000 RESEARCH PROJECTS

Also:
Emphasis: Materials handling/distribution
Freeze concentration breakthrough
Government forecast for '83

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(Cover photo by Robert Veltri)

COVER STORY: This special report contains a listing and analysis of 1,000 Food Research Projects currently active or recently completed.

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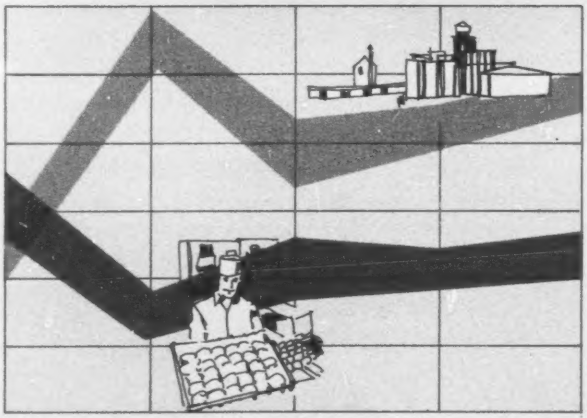

GOV'T FORECAST FOR '83: The U.S. Department of Commerce forecasts slow growth for some segments of the food industry; and no growth for others.

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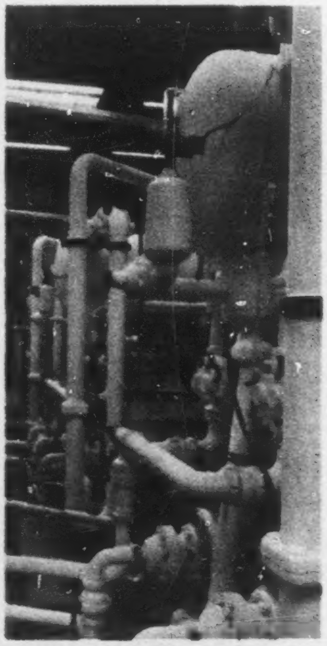

FREEZE CONCENTRATION: A new energy-efficient process is expected to breathe new life into freeze concentration. First installations show promising results.

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THE POUCH-CUP: A foil-lined paperboard pouch turns into a drinking cup. It's used in Japan to package instant drinks and soups.

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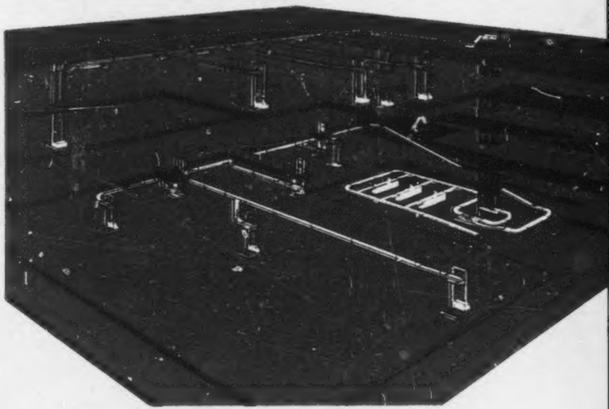

HANDLING & DISTRIBUTION: This month, special emphasis is given to materials handling and distribution. Along with a rundown of new equipment, eight articles describe how food companies are taking advantage of the latest techniques.

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Events

The industry in 1983: What's ahead?

The U.S. Department of Commerce forecasts slow growth for some, none for others

Growth in food and beverage industry shipments is straining under the twin influences of a slowing population growth and the generally flaccid condition of the American and world economies. According to the newly released *U.S. Industrial Outlook 1983* from the Department of Commerce, the value of all food and beverage shipments was about $286 billion last year. This was a 6 percent increase over 1981, but only 1.1 percent when inflation is factored in. If the current inflation rate holds, the Commerce Department forecasts a slim 1.1 percent real increase in 1983.

Although the profits of industry firms—particularly the major ones—have held up in 1982, the industry as a whole is faced with declining consumer spending on food and beverages as a proportion of all personal consumption expenditures. That figure declined at an average rate of 0.8 percent between 1976 and 1981, when the share of consumer outlays spent on food and beverages figured at 19.1 percent.

The good news, of course, was the relief the industry felt from declining agricultural prices and only modest increases in wage rates, energy and packaging and transportation costs. This was reflected in producer prices that rose only an estimated 1 percent in 1982, compared with 2.2 percent the previous year.

MEL SELIGSOHN, News Editor

The Commerce Department report confirms again that advancing technology is impacting on production employment which decreased about 2 percent last year. Between 1972 and 1982, the number of production workers decreased 0.3 percent annually, a loss of more than 21,000 jobs. However, the real value of production rose by 1.7 percent annually as processors invested in new and more efficient plants and equipment.

Meat packers are hurting

Growth, however, appears to be coming more through mergers and acquisitions rather than capital spending. "Responding to stagnant product markets, weak real growth, high interest rates, costly equity funding, and overcapacity, food and beverage processors emphasized mergers and acquisitions as a growth strategy in 1982. Conversely, firms decreased their spending for new plant and equipment.

"In fact, it appeared that a record number of food industry mergers and acquisitions were consummated during the year. By mid-year, 345 acquisitions of food-related companies had been recorded, an increase of 20 percent over 1981," said the *Outlook,* adding that an estimated 700 mergers and acquisitions had taken place last year.

The following are profiles from *Outlook '83* from industries that account for over 70 percent of all food and beverage shipments:

Meat and Meat Products

This industry is composed of meat packing plants (SIC's 2011, 13), and poultry and egg processing (2016,17), with the former accounting for almost 85 percent of industry shipments. The red meat industry is not expected to experience any real growth in 1983—for the seventh consecutive year. Total production is expected to be about 1.4 percent lower than in 1982.

This lack of growth is hurting profits, which according to the American Meat Institute, declined about 37 percent from 1980, the lowest in five years. Despite lower livestock and raw materials costs, operating expenses jumped 14 percent to $11.2 billion, reflecting higher wages and a 21 percent increase in interest costs.

Prospects for the poultry industry this year are more favorable. Production will probably increase, and the value of shipments of poultry and related products measured

(Continued on page 28)

Trends and projections 1972-83

(in millions of dollars except as noted)

Industry data	1972	1977	1979	1980	1981[1]	1982[2]	Compound annual rate of growth 1972-82	1983[3]	Percent change 1982-83[3]
Red Meat Industry (SIC's 2011, 2013)									
Value of shipments[4]	27,636	39,674	53,021	53,468	54,304	56,820	—	—	—
Value of shipments (1972 $)[4]	27,636	29,450	25,678	29,295	29,332	29,430	0.6	29,460	0.1
Total employment (000)	216	211	208	207	203	197	−0.9	195	−1.0
Poultry and Related Industries (SIC's 2016, 2017)									
Value of shipments[4]	3,842	6,603	8,617	9,487	10,174	9,054	—	—	—
Value of shipments (1972 $)[4]	3,842	4,374	5,279	5,660	5,967	5,985	4.5	6,180	3.3
Total employment (000)	92	98	109	118	116	112	2.0	112	0.0
Dairy Products (SIC's 2021, 2022, 2023, 2024, 2026)									
Value of shipments[4]	16,312	26,010	30,209	33,930	36,697	39,371	—	—	—
Value of shipments (1972 $)[4]	16,312	18,110	17,315	17,781	17,975	18,491	1.3	18,514	0.1
Total employment (000)	189	154	153	149	147	146	−2.5	—	—
Canned Fruits, Vegetables and Specialties (SIC's 2032, 2033)									
Value of shipments[4]	5,920	9,492	11,489	11,987	13,259	14,483	—	—	—
Value of shipments (1972 $)[4]	5,920	6,146	6,340	6,203	6,208	6,248	0.5	6,350	1.6
Total employment (000)	119	109	109	105	96	86	−3.3	86	0.0
Frozen Foods (SIC's 2037, 2038)									
Value of shipments[4]	3,784	6,702	8,257	8,643	9,713	10,765	—	—	—
Value of shipments (1972 $)[4]	3,784	4,462	4,537	4,489	4,449	4,499	1.7	4,635	3.0
Total employment (000)	81	88	97	91	86	82	0.1	81	−1.2
Miscellaneous Fruits and Vegetables (SIC's 2034, 2035)									
Value of shipments[4]	1,774	4,139	4,943	5,425	6,019	6,328	—	—	—
Value of shipments (1972 $)[4]	1,774	2,555	2,554	2,709	2,783	2,843	4.8	2,960	4.1
Total employment (000)	33	38	39	38	36	33	0.0	33	0.0
Cereal Breakfast Foods (SIC 2043)									
Value of shipments[4]	1,126	2,498	3,096	3,476	3,950	4,298	—	—	—
Value of shipments (1972 $)[4]	1,126	1,455	1,507	1,479	1,505	1,519	3.0	1,533	0.9
Total employment (000)	12.9	16.4	16.3	15.9	15.6	15.4	1.8	—	—
Bread, Cake, and Related Products (SIC 2051)									
Value of shipments[4]	6,132	9,275	10,738	11,703	12,435	13,255	—	—	—
Value of shipments (1972 $)[4]	6,132	6,011	5,817	5,692	5,611	5,701	−0.7	5,588	−2.0
Total employment (000)	193.5	178.0	184.4	181.9	179.4	178.0	−0.8	—	—
Cookies and Crackers (SIC 2052)									
Value of shipments[4]	1,764	2,961	3,708	4,036	4,450	4,700	—	—	—
Value of shipments (1972 $)[4]	1,764	1,702	1,850	1,810	1,841	1,897	0.7	1,927	1.63
Total employment (000)	41.1	43.8	47.0	47.7	46.4	45.4	1.0	—	—
Confectionery Products (SIC 2065)									
Value of shipments[4]	2,473	4,498	5,069	5,771	6,377	6,836	—	—	—
Value of shipments (1972 $)[4]	2,473	2,787	2,947	3,190	3,408	3,598	3.8	3,745	4.1
Total employment (000)	61	58	55	54	56	58	−0.5	57	−1.7
Alcoholic Beverages (SIC's 2082, 2084, 2085)									
Value of shipments[4]	6,717	10,312	13,303	14,940	16,607	18,358	—	—	—
Value of shipments (1972 $)[4]	6,717	8,175	9,133	9,428	9,670	10,068	4.1	10,515	4.4
Total employment (000)	79	69	71	68	68	66	−1.8	65	—
Bottled and Canned Soft Drinks									
Value of shipments[4]	5,454	10,007	12,544	13,909	15,230	16,799	—	—	—
Value of shipments (1972 $)[4]	5,454	6,386	6,980	6,785	6,341	6,698	2.1	6,775	1.1
Total employment (000)	121	114	119	118	119	122	0.1	122	—

[1] Estimated except for product price index, exports, and imports. [2] Estimated. [3] Forecast. [4] Value of all products and services sold by industry

Source: Bureau of the Census and Bureau of Industrial Economics.

The industry segments in the above chart account for over 70 percent of all food and beverage shipments in the U.S. Estimates for 1983 values are projected from a 1972 base, omitting the inflation factor.

FORECAST . . .

in constant dollars should increase about 3.3 percent. Because of efficiency factors, poultry industry shipments will probably continue to outpace those of the red meat industry in the next few years. Another plus for poultry is that consumers now perceive poultry products as healthier than red meat due to its lower fat content.

Dairy Products

Value of shipments for all dairy products should reach $18.514 billion in 1983, or unchanged in dollars adjusted for inflation. Shipments of fluid milk products, butter, and frozen desserts are expected to decrease slightly, offsetting small gains in shipments in cheese and evaporated milk. Over the long-term, shipments are expected to rise only 0.1 percent annually from 1982 to 1987, after adjustment for inflation.

However, innovative technology and product development could change the dairy industry's prospects by mid-decade. Aseptic packaging, ultrafiltration, and whey permeate conversion may help to reinvigorate the dairy sector. Shipments of cheese and yogurt—considered "health foods" by the public—should advance strongly.

Government regulation affects this sector strongly. A trend towards the reduction of price supports for dairy products, and dissatisfaction with commodity programs that have tended to load huge surpluses of cheese and other products on the government could bring monumental changes to industry business practices in the next few years.

Processed fruits, vegetables, specialties

In 1982, the value of goods produced by these sectors was estimated at $31.6 billion, about 9 percent over 1981 levels. In constant dollars, however, the value of industry production increased only 1.1 percent. Consumer demand for most canned vegetables was sluggish, as consumers showed a continuing preference for fresh or frozen products. Most of the growth in production of canned goods in recent years have been in fruit juices, ethnic foods, and tomato products.

1983 could be a turning point, however. For the first time since 1977, the industry is expected to experience a meaningful rate of real growth. The value of industry production, measured in constant dollars, will probably increase about 2.6 percent.

Fruits & vegetables are turning around

Production of canned fruits and vegetables, the largest sector should increase about 1.6 percent, aided by increased demand for aseptic products, low-sodium canned vegetables, fruits packaged in light syrup, and retortable pouch entrees. Production of frozen foods increase about 3.0 percent as additonal low-calorie and high nutrition entrees help to reverse the downward per capita consumption trend. Shipments in miscellaneous fruits and vegetables will rise about 4 percent as a result of strong demand for sauces and salad dressings.

Cereal breakfast foods

The demand for these foods has slackened in recent years partly because of a decrease in the number of people under 21-years-old. Growth has come from the marketing of natural and high protein cereals, and hot cereal sales have been increasing also as a result of gains in the infant and elderly population sectors. Although brands of private and general label cereals have gained in recent years, national brands dominate the cereal market.

Because the breakfast cereal market is controlled by four large companies, the Federal Trade Commission, using the theory of "shared monopoly," attempted in 1972 to break up the industry into smaller segments. In January of 1982, however, the agency dropped the case after failing to prove collusion among the companies.

This year the value of industry shipments is expected to increase about 0.1 percent, in dollars adjusted for inflation. Firms will probably increase their promotional efforts for unsweetened and less sugared products, while new brands of cereals will probably emerge during the year.

Bakery foods

Last year the value of industry shipments of bakery products was just under $18 billion, a 6.3 percent increase or about 2 percent adjusted for inflation. 75 percent of total shipments were in the bread, cake and related products sector, which shipped about $13.3 billion; while shipments in the cookie and cracker segment increased to $4.7 billion, a 3 percent gain when adjusted for inflation.

In 1983, the value of bread, cake and related products is expected to decline about 2.0 percent, but the cookie and cracker industry should increase 1.6 percent. Shipments of variety breads will increase only marginally, while consumption of white bread will continue its gradual decline. The strength of the cookie and cracker segment will derive more from crackers than cookies, due to the fact that there has been a steady annual decrease in the age group under 20; adults generally favor unsugared crackers and snacks. Producers of fresh and frozen biscuits, frozen dough, self-rising flour, and biscuit mixes will continue to benefit from the rise in the number of fast food outlets serving breakfast.

Confectionery products

Shipments in SIC 2065 increased to about $6.4 billion last year, an increase of 6.5 percent over 1981. Chocolate and nonchocolate candies still dominate the industry, ac-

(Continued on page 30)

FORECAST . . .

counting for over 85 percent of product sales. The estimated value of shipments in this category was $5.6 billion, about 8 percent above 1981.

Product shipments of confectionery products in 1983 are expected to increase 3.8 percent in dollars adjusted for inflation. Prices of these products will probably remain stable, although reductions in the weight of candy bars may occur. Ingredient supplies are expected to remain plentiful.

Alcoholic beverages

Product shipments of alcoholic beverages reached an estimated $17.3 billion last year, an increase of 9 percent over 1981, or 2 percent adjusted for inflation. Per capita consumption, however, declined fractionally during the year, mainly as a result of high unemployment weakening the market for distilled spirits. Product shipments of beer and ale were up only about 1.2 percent compared with an average annual growth rate of 4 percent from 1972 to 1982, reflecting the growing number of elderly people in the population and the declining number of new users reaching the legal drinking age.

More unemployment, less booze

Prospects for the industry this year are mixed. Major gains in consumption are unlikely, and competition among product rivals for a larger share of the market is expected to intensify. Shipments in the industry are expected to increase about 4 percent, in dollars adjusted for inflation. Malt beverages should rise 1.0 percent, distilled spirits 3 percent, and wine and brandy shipments 2.6 percent.

Bottled and canned soft drinks

Shipments in SIC 2086 last year totaled an estimated $14.5 billion, an increase of about 10 percent over the previous year. Per capita consumption has increased annually over the past decade in the soft drink area, but both consumption and output have increased at a slower rate since 1979. Bottlers are striving to stimulate weakening demand, improve market share and overcome the dampening effects of a sluggish economy with new products, extensive promotion, and increased advertising.

Competition in the industry is expected to remain intense in 1983 as firms attempt to broaden market share and consolidate new product gains, although per capita consumption is not expected to increase much. Product shipments, adjusted for inflation, are expected to reach about $5.8 billion in 1983, up about 2.7 percent for the year.

OSHA suspends carcinogen list

The Occupational Safety and Health Administration (OSHA) has suspended a proposal, first presented by the Carter Administration, that would require the government to publish lists of suspected cancer-causing substances in the workplace. OSHA said the reason for doing so was to allow it to re-evaluate and revise its policy for identifying, classifying and regulating working place carcinogens.

Labor groups criticized the action, saying it was "watering down" federal policy, and another move by the Reagan Administration to weaken OSHA standards. "Without lists, there's no way to measure what they're doing in this area. It's a relapse to pre-OSHA days when research and regulatory targets were chosen in secret," said an official for the AFL-CIO's Industrial Union Department, adding that the move reflected the Administration's pre-business stance.

OSHA said that the 1980 carcinogen policy had called for the agency to publish two types of lists twice a year—a candidate list that included suspected carcinogenic substances and a more limited priority list of known carcinogens, to which exposure standards would have been set under separate health standards. One candidate list was published in 1980, but no follow up priority list.

"Misuse and misinterpretation of the agency's initial 1980 candidate list are additional reasons for the stay," said OSHA. Misinterpretation of this list could cause serious economic problems for a company making or using a listed substance. A firm's business could suffer severely before it has been shown whether a product is actually harmful, said OSHA.

Food standards: Hayes asks for industry input

The future of food standards rests in part in the hands of industry lawyers and executives, said FDA commissioner Dr. Arthur Hull Hayes, Jr., recently, and he urged more participation with the agency in formulating that future. Calling for a reassessment of the standards, Hayes commented:

"Some have argued that food standards are out of date, that they merely accomplish economic regulation, and that FDA should get out of that business. Others disagree, saying that consumers need and rely on food standards to assure uniform quality and good value. That these are not easy questions does not excuse us from answering them; we must be certain that we work together to resolve them."

Also commenting on food standards at the recent Food and Drug Law Institute conference in Washington, attorney Richard L. Frank said that grandiose approaches in trying to resolve problems involving pineapple juice, yogurt, lemonade and bread served little useful purpose and "simply lead to greater confusion among consumers and bitterness among industry executives."

Dr. Sanford A. Miller, FDA Bureau of Foods Director, predicted the emergence of new sources of food in the future will require a new approach to food standards, since a new food may actually be superior nutritionally to a standardized one.

At the same conference, FDA Commissioner Hayes discussed the agency's recent pilot enforcement program

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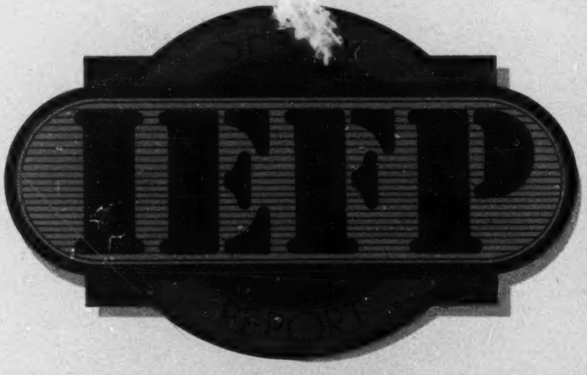

COVER STORY: Twelve separate articles, beginning on page 73, describe the trends and developments seen at the International Exposition for Food Processors.

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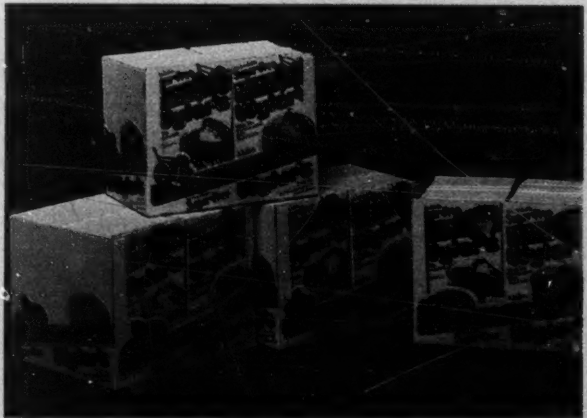

ASPARTAME-SWEETENED: Borden plans a national roll-out with Wyler's sugar-free drink mixes sweetened with aspartame.

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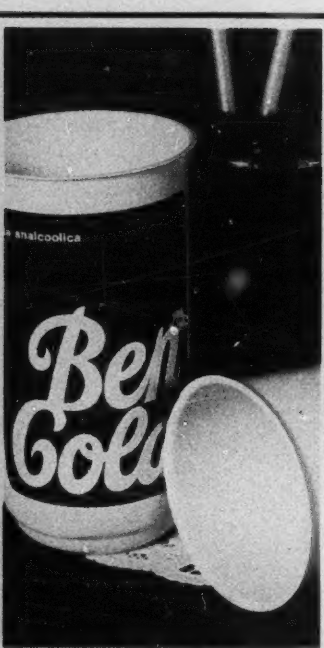

PLASTIC CAN: A 7-layer coextruded plastic can from Italy is eyeing the U.S. beverage market.
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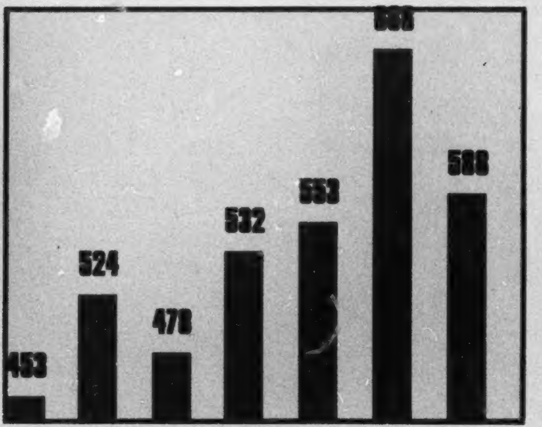

MERGERS & ACQUISITIONS: The fast pace continues, as transactions in the food industry last year were the second highest in a decade.
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Mergers: The fast pace continues

Despite a small retreat, transactions last year were second highest in a decade.

The food industry's drive towards consolidation through mergers and acquisitions continued in full throttle in 1982. The Food Institute, located in Fairlawn, N.J., which has tracked these activities for the past 10 years notes 588 merger and/or acquisition transactions, the second highest level in the decade, in its latest report. That figure was topped only in 1981 when 666 transactions were recorded.

About one-half of the purchases during 1982 involved an entire company, while 44.2 percent were of a division of a company, and a minor number were stock transactions only. Of the 588 transactions recorded, 53.7 percent were of similar businesses, an increase from 48 percent in 1981.

Although significant transactions outside the food business did take place last year, food companies generally stayed closer to home. In 1981 almost one-quarter of all moves were outside the food industry, but only 16.7 percent were in this year's FI survey.

During the past 10 years, FI has recorded about 4,865 transactions in the merger/acquisition area. As the accompanying chart shows, the numbers grew steadily from 1973, peaking in 1977, dropping in 1978, but increasing to levels above 1977 in every year after 1978. "While this may partially be a function of improved recording techniques on the part of the Food Institute, there is no doubt that the level of transactions has reached greater proportions than in years past," FI stated in its new report.

MEL SELIGSOHN, News Editor

New merger guidelines

Aside from the natural forces of the marketplace and economic climate, there's little doubt that the increasing rate of merger and acquisition activity in the most recent years is a result of new government policy. The Reagan Administration is clearly less opposed to industry concentration than its Democratic predecessor. This is reflected in Federal Trade Commission policy, and in the position on antitrust taken by the Department of Justice.

Gov't policy has relaxed

Indeed, last year Attorney General William French Smith announced revisions in the Justice Department's merger guidelines that had been in effect since 1968. These guidelines outline the general principles and standards that the Department's Antitrust Division uses in screening mergers every year. "Their purpose," said Attorney General Smith, "is to provide guidance to the business community, private lawyers and others in anticipating what standards will be used and how they will be applied."

The 1968 guidelines dealt with three kinds of mergers—horizontal, vertical and conglomerate. Horizontal are those between competitors; vertical are those involving firms in the same supply chain, such as a manufacturer or a product and the distributor of the same product; conglomerate are those between firms in different lines of business or between firms in the same line but in economically separate geographic regions.

The main purpose of the new guidelines is the prevention of mergers that make easier the exercise of market-power—the ability of one or more firms to raise prices above a competitive level and to prevent the monopolization or cartelization by one or several firms of any significant economic markets.

The new guidelines have only two categories—horizontal and non-horizontal mergers. They allow in general some horizontal mergers that the old guidelines would have challenged, and generally provide for the challenge of other mergers only where there are indications that there would be some horizontal effect, real or potential.

In short, they usually require an indication of harm to competition by affecting firms in competition with one another. The new guidelines have been designed in particular to show evidence of harm or potential harm to competition before a merger will be challenged. Where numbers are not applicable, efforts are made to state in detail the kinds of factors that would be weighed.

The Herfindahl Index

The new guidelines use what is known as the Herfindahl Index to measure market concentration. This is calculated by squaring the percentage market share of each firm in the market and then adding those squares. For example, if there were a market in which four firms each had a 15 percent share and 40 firms each had a one percent share, and a second market where one firm had 57 percent of the market and the remaining 43 firms one percent each, the first market would have an index of 940 and the second an index of 3,292—more than three times as great.

In the first market, the Department's concern about mergers would be relatively low, and the second high. The index of concentration after the merger, and how much that differs from the index before the merger are important in actually applying the Herfindahl to a merger situation.

In addition to the Index, the new guidelines discuss the process of market definition in detail. Defining the relevant market is important in merger analysis, because what is selected and how that market is defined can be vital in determining whether or not the merger is deemed anticompetitive enough to warrant challenge by the Antitrust Division.

The goal of market definition is to identify and consider all the firms that would have to cooperate in order to raise prices above the competitive level and keep them there. For instance, the guidelines suggest that in considering whether to include a particular product or firm in the market, a small price increase might be hypothesized. Would such an action be likely to cause customers to shift to a different supplier or a different product?

If a sufficient number of customers would shift to a substitute product or another supplier to make a price increase unprofitable, the market definition probably needs to be expanded to include that product or that supplier.

Beatrice leads merger list

With a total of nine transactions, Beatrice Foods, Chicago, led the list of acquiring companies last year. The company's major moves were in the beverage area with the purchase of Coca-Cola Bottling of Los Angeles, San Bernadino, San Diego, Spirit Lake, Iowa, and Mason City, Iowa. According to the *Wall Street Journal,* the three West Coast bottling operations "give Beatrice a hammerlock on the market for Coke in the enormous beverage drinking district of southern California."

Other acquisitions last year included: London-based confection-

(Continued on page 23)

[illegible] the past 10 years.

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ACQUISITIONS . . .

ary company Callard & Bowser Nuttall; Winner Food Products Ltd., a Hong Kong food processor specializing in Chinese foods; Termicold Corp., Portland, Oregon, the world's largest independent public refrigerated warehouse operation; Sanitary Water Company, Ft. Worth, Texas.

The Coke moves seemed to indicate that Beatrice plans to enlarge its presence in the beverage industry, since it also has expanded the marketing of Cap 10 sparkling mineral water and Tropicana Products citrus juices. "With the acquisitions of our bottling franchises, we have opened many new areas for growth in both the U.S. and overseas," the company pointed out.

Beatrice is merger leader

Other major mergers

■ Anheuser-Busch/Campbell-Taggart: With prospects of slackening growth ahead of it in the beer industry, Anheuser-Busch decided to join forces with the nation's second-largest bread baker to enhance its growth prospects. The brewer had shown an increase of only seven points in market share during the early Seventies, but was thrust into action as a result of the threat from Miller, flush with capital from parent Philip Morris. In the past five years, Miller's share of the domestic beer market has dropped by about the same percentage as Anheuser gained.

Nonetheless, due to restructuring within the beer industry, analysts of the industry say that even if the company were to achieve a goal of 40 percent share of the beer market before 1990, a point would be reached where it would no longer be able to make such strong gains. Therefore, the company has searched for opportunities elsewhere, and since it is already a leading producer of baker's yeast with a market share of over 50 percent, the Campbell-Taggart merger made a great deal of sense.

■ The Kroger Co./Dillon Companies: "Kroger operates a number of new and efficient manufacturing plants that can provide products to Dillon and add significantly to the combined profits of the merged companies," said the Chairman of Dillon, the Hutchinson, Kansas, retailer that operates around 218 supermarkets located mainly in Colorado and Kansas.

■ RJR/Heublein: In an acquisition completed in October 1982, RJR Industries, Inc., Winston-Salem, N.C., the diversified foods, tobacco, energy and transportation firm joined with Heublein, Inc., Farmington, Conn., creating a company with $13.8 billion annual sales.

With this acquisition, RJR will join rival Philip Morris in the beverage and liquor business.

Processor acquisitions

The following are companies that are primarily food processors and the firms they have acquired recently in the food processing field followed by the type of business acquired in parentheses.

ADM: Columbian Peanut Co. (large peanut sheller); Paris Milling (feed mill and grain elevator operator); Valmac Industries (poultry processor). **Campbell Soup:** Mrs. Paul's Kitchens (frozen food plants); Juice Bowl Products (fruit juices); Snow King Frozen Foods (frozen meat specialties). **Cargill:** Seaboard Allied Milling (flour mill operations). **Conagra:** Pacific Fish Co. (seafood distributor); Peavey (grain processor); Alaska Packers (seafood div. in Western states).

Consolidated Foods: C & C Cola (soft drinks). **Diamond Crystal Salt:** Dietary Specialties Ltd. (low sodium seasonings, sauces, soups and entrees). **General Coffee:** Arden Foods (frozen entrees); Coffee div. Nabisco Brands (roasting plants). **General Foods:** Entemann's (baked goods). **Hanover Brands:** Myers Foods (frozen meat pies). H. J. Heinz: Olivine Industries (vegetable oil in Zimbabwe).

Heublein: Caldwell (distiller). **Jeno's:** Anthony Baking (frozen dough items); Gino's Pizza, Cresta Mexican and Creative Crust brands (frozen food, pizza and an entree line); John's Pizza (pizza). **Kelly Foods:** Republic Food Products (canned meat). **Knudsen:** Landmark Nutrition (bulk and private label marketer of cheeses). **McCormick:** Productos Alimenticios Linguanotto (Brazilian spice packer).

Nabisco Brands: Galletas Artiach (cookies and crackers, Spain); Huntley and Palmer (biscuit and snacks, Britain). **Pepperidge Farm:** (div. of Campbell Soup); Costa Apple Products (apple juice products). **S. S. Pierce:** vegetable operations of Libby, McNeill & Libby (five processing plants). **Pillsbury:** Wickes Co.'s Agricultural Div. (grain processing); Dawley & Sheppard (cracker breader for foodservice and industrial); Hammons Sauce (specialty sauce, Britain).

PYA Monarch: (Consolidated Foods div.); Malone & Hyde (institutional foodservice operation). **Quaker Oats:** Ardmore Farms (frozen juices); Ralston Purina, European assets (pet food plants). **Red Wing Co.:** Western Food Products (private label food packer). **Rich Products:** Casa Di Bertacchi (frozen specialty meats); Turner Foods (meat packer); Wakefield Seafoods (seafood processor).

J. M. Smucker: Magic Shell, div. Foremost-Mckesson (dessert toppings); **Charles G. Summers Jr. Inc.:** Durkee O & C Brand, div. SCM Corp. (line of whole bailed onions). **United Foods:** Stokely-Van Camp (Domestic frozen food operations including various plants, trademarks and inventories); Freezer Queen Foods, Div. Nabisco Brands (frozen foods producer and marketer). **Vlasic Foods** (div. Campbell Soup); Food Division of Win Schuler Foods (cheeses, sauces and salad dressings).

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Food Companies

IAN R. WILSON has been elected president and chief executive officer of **Castle & Cooke, Inc.** He will also serve on the company's board of directors.

A. HANK GRESE has been promoted to vice president and general sales manager for the grocery group, **Pet Inc.**

JAMES R. STOLLE has been appointed vice president and general manager of the grain division, **International Multifoods.**

Leonard P. Judy

H. Eugene Blattman

LEONARD P. JUDY has been named president of **Libby, McNeill & Libby, Inc.**

H. EUGENE BLATTMAN has been appointed president of **Foremost-McKesson's** foods group.

1983 Food Engineering Graduates

The following Universities will be graduating students with a major or degree in Food Engineering through Agricultural, Biological, or Food Engineering Departments.

University	Number of Graduates	Faculty Member	
Univ. California-Davis	BS— 2 MS— 2 PhD— 2	Paul Singh Larry Merson	(916) 752-0811 (916) 752-1487
Colorado State Univ.	BS—10 MS— 5 PhD— 1	Vince Murphy	(303) 491-7871
Cornell Univ.	BS— 5	Gerald Rehkugler	(607) 256-4548
Univ. of Florida	BS— 4 MS— 1	Arthur Teixeira	(904) 392-1864
Univ. of Illinois	MS— 1	Errol Rodda	(217) 333-6762
Kansas State Univ.	MS— 1	Do Sup Chung	(913) 532-5580
Univ. of Massachusetts	BS— 4 MS— 5 PhD— 3	Joe Clayton	(413) 545-2367
Michigan State Univ.	BS— 3 MS— 5 PhD— 2	Jim Steffe Dennis Heldman	(517) 353-4544 (517) 355-8468
Univ. of Minnesota	BS— 4 MS— 2	David Thompson	(612) 373-1348
North Carolina State Univ.	MS— 3 PhD— 2	Don Hamann	(919) 737-2959
Ohio State Univ.	BS— 3 MS— 1	Floyd Herum	(614) 422-8972
Oklahoma State Univ.	BS— 8 MS— 1	Gerald Brusewitz Bob Clary	(405) 624-5426 (405) 624-5426
Penn State Univ.	BS—16 MS— 1	M. E. Schroeder	(814) 865-3089
Purdue Univ.	BS— 9 MS— 4 PhD— 6	Martin R. Okos	(317) 494-1211
Texas A&M Univ.	BS— 4 MS— 7 PhD— 2	Ken Diehl Vince Sweat	(713) 845-3931 (713) 845-3931

Compiled by Dr. Gerald Brusewitz as an activity of ASAE FE-04 Publications Committee.

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Chilton's Food Engineering

May 1983

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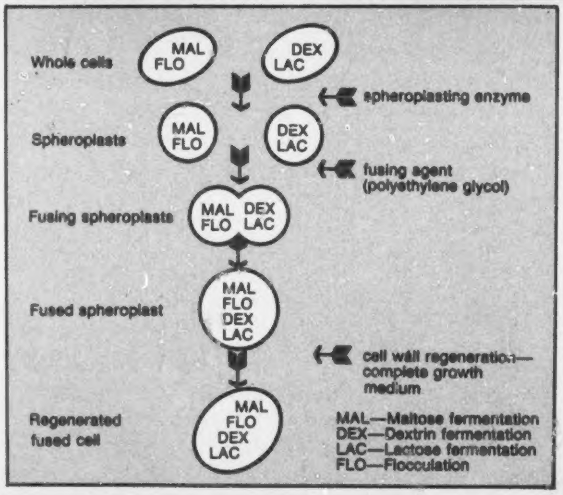
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GREAT TASTING JUICES: New fruit liquefaction enzymes permit the whole fruit to be used to produce high-quality juices, pulps and concentrates.

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FOOD ENGINEERING® (ISSN 0193-323X) May 1983, Vol. 55, No. 5. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. Title registered in U. S. Patent Office.
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Events

Jobs: Labor's new strategy

Recent agreements trade wage hikes for a new generation of concessions

MEL SELIGSOHN, News Editor

The reality of America's economic plight has finally hit the labor movement in full force. Despite signs of an economic recovery, labor knows that many jobs lost during the recession will never materialize again, as a result of intensifying foreign competition, changing technologies and a severely out-of-date equipment and plant inventory.

Needless to say, the labor movement accepts no responsibility for the enfeebled condition of the economy, but, generally, contract negotiations over the past 12 months have emphasized non-wage issues such as retraining and job security, in recognition that demands for higher wages will only result in further permanent job losses.

The food industry, unlike some of the country's other basic industries, sailed through the recent recession in relatively good shape. Lower commodity prices helped brighten the financial picture. Still, employment in the industry has been trending downward gradually for many years. From 1979 to 1982 the industry lost 6.3 percent of its workers, among the lowest rates among U.S. industries but still a deep concern to labor leaders. By comparison, primary metals plunged 36.8 percent on one end of the scale, while printing and publishing lost only 1.0 percent on the other. (see accompanying chart)

Along with its sister unions, food unions now view such job losses as the major threat of the decade to both their members' welfare and their own ability to call the shots in the economy. Who should bear the blame? "There is a lot of feeling developing among the unions that poor management got us into this mess. But for the sake of job security, some of our unions will, to a certain extent, cooperate with an industry in cleaning up that mess," says John Zalusky, A.F.L.-C.I.O. specialist in collective bargaining. Last year, says Zalusky, food unions along with auto, trucking and rubber unions signed some of the cheapest contracts in decades. Increases averaged only 3.8 percent, the lowest since the Government began recording this statistic in 1968.

Pushing for capital spending

Creative solutions sought

A key food industry segment agreement was reached last year that could signal a major shift in strategy labor towards the industry. That agreement was between the Packinghouse Division of the United Food and Commercial Workers Union and Armour and Wilson Foods. The three year contract, which established a national pattern agreement for other packers under Master Agreement contract, contained an unusual provision—that management provide the union detailed reports of capital expenditures for each plant at the end of each year.

Other provisions include: no increases in current wages of benefits; concessions in cost-of-living provisions; a wage reopener on September, 1984, with the right to strike; a small increase in the basic pension benefit rate from $15 a month per year of service to $17, effective September, 1985; no notice of plant closings until July 1, 1983; additional coverage in basic health insurance; when the company builds a new plant, management will recognize the UFCW Union as the worker's representative after a majority sign union cards; an experimental 90-day starting wage rate period for new workers.

The message in this agreement is that although the union was willing to concede to moderate contract changes it wants to keep close track of plant and equipment investment. Only by doing so can it be assured that wage and other concessions on its part will be reflected in job-saving investment by companies in the industry.

Ironically, the unions enjoy quoting that organ of capitalism *Business Week* to underscore their concern. In its highly-publicized article, "The Reindustrialization of America," American professional managers were criticized for their role in the decline of U.S. manufacturing.

"Plant closings are the final dramatic concession from today's chief executives that management has not done its job in keeping its plants up-to-date. Such a concession represents decades of maximizing profits to look good for the short-term, while ignoring the long-term consequence," it said.

UFCW cites problems in the meat packing industry as originating in this kind of myopia by management. Their argument is impressive. "Conglomeration accomplished in a decade what competition couldn't change in a century. In the last ten years . . . conglomerate-owned packers lost their top position in the industry because they were allowed by their parent companies to be out-invested, out-managed, and out competed.

"For example, Iowa Beef, Oscar Mayer and Hormel succeeded because they reinvested hundreds of millions of dollars back into their operations and built new plants. Since 1976, IBP has built the world's largest beef slaughter plants in Amarillo, Texas, and Garden City, Kansas. Hormel completed a giant hog kill and processing plant in Austin, Minnesota, and Oscar Mayer built two modern processing plants in Sherman, Texas, and Columbus, Georgia. In comparison, Armour, Swift and Wilson have closed 51 plants since 1970, and only Swift had built a new plant since 1975," says the UFCW.

What UFCW fails to point out, however, is that both the conglomerate-owned companies and their "independent" competition are approaching the same problem—inefficiency and out-moded facilities—but from different angles. The conglomerates are absorbing companies that are being sold at a discount because of inherent problems. Such companies cannot compete because they many not have the resources to plow back into capital programs. Indeed, they are usually saddled with excessive labor costs. On the other side, however, companies in the industry that are building new plants do so in part to automate, in which case jobs are also lost. The unions apparently believe that newer plants with fewer jobs is preferable to moving the industry overseas—which is happening elsewhere.

Elsewhere in the food industry UFCW is also targeting jobs rather than wages as its primary objective. Recently, employees of 40 Kroger Co. Grocery stores in Western Pennsylvania agreed to $1.10 an hour in wage and benefit cuts in exchange for a company promise to complete and open five large stores in the Pittsburgh area. The stores are expected to employ about 500 members of local 590. Kroger also agreed to end its efforts to sell seven existing stores, which would have cost the union about 365 jobs. That union has made a similar agreement with the financialy-troubled Giant Eagle Markets, a Kroger competitor.

The Kroger terms included a variety of concessions that would have been unbelievable only a few years ago—waiver of a recent cost-of-living pay adjustment; a wage

(Continued on page 25)

Food Industry Bargaining Agreements Expiring in 1983

(1,000 workers or more)

A E Staley Manufacturing Illinois	1,500
Brach E J & Sons Inc Illinois	3,200
Brewery Prop Of Milw Miller, Pabst & Schlitz Wisconsin	2,700
Campbell Soup Co Napoleon Ohio	1,850
CPC International Inc Corn Div Il Mo & Tx	1,800
Dairy Empire Labor Council Master Agmt	1,000
Genl Foods Corp Post-Carton & Container Michigan	1,400
Heinz H J Co Heinz USA Div Pittsburgh Pa	1,800
Hershey Foods Corp Hershey Pa	2,300
I-A Fluid Milk-Ice Cream Agreement California	1,350
I-A Milk Dealers Phila & Vic Pennsylvania	1,700
I-A Pineapple Companies Factory & Plantations Hawaii	6,000
Lykes Pasco Packing Co Dade City Fla	1,000
Nabisco Foods Co Nabisco Brands Inc Inter	10,300
Pet Inc Whitman Chocolates Div IC Indus Co Phila Pa	1,000
Simplot J R Co Food Processing Plant Caldwell Id	1,100
Standard Brands Inc Curtiss D Franklin Prk Plt Illinois	1,000
Star-Kist Foods Inc Los Angeles Calif	3,500
Sugar Cos Negotiating Comm Hawaii	7,000
Wholesale Bakers Group Mach Shop California	1,000
Winery Employers Assn California	2,000

Over 50,000 workers are covered by contracts with food concerns that expire this year.

Employment Declines by Industry

(1973-82)

Industry	Percent decline		
	1973-75	1981-82	1979-82
Durable goods:			
Lumber and wood products	22.7	12.5	21.6
Furniture and fixtures	21.3	9.0	14.1
Stone, clay, and glass products	15.3	14.7	22.8
Primary metal industries	15.5	29.4	36.8
Fabricated metal products	15.2	15.6	21.3
Machinery, except electrical	10.3	17.5	17.6
Electric and electronic equipment	17.9	8.4	9.8
Transportation equipment	13.2	15.7	23.0
Instruments and related products	9.8	6.7	6.7
Miscellaneous manufacturing	13.7	11.0	17.1
Nondurable goods:			
Food and kindred products	5.2	3.5	6.3
Tobacco manufactures	7.6	14.1	15.3
Textile mill products	19.3	13.8	19.7
Apparel and other textile products	18.1	10.3	16.0
Paper and allied products	12.4	6.5	8.6
Printing and publishing	3.9	1.0	1.0
Chemicals and allied products	6.3	5.0	5.6
Petroleum and coal products	5.1	5.1	5.1
Rubber and misc. plastic products	16.7	10.0	15.2
Leather and leather products	17.8	15.1	19.8

Employment decline in the food industry has been far less than some other major industries.

Source: *U.S. Department of Labor*

freeze extension; seven paid holidays instead of 12; and time and one-half pay for work on Sundays and holidays, instead of double time.

At the same time, however, union members agreed to split off 12 Ohio and West Virginia stores from their bargaining unit, and employees of those stores, which were generally more profitable than the Pennsylvania ones, were not asked to accept the concessions.

Will concessions save jobs?

Despite concessions by the unions—which may very well dry up as the economy strengthens—many experts believe that a shrinking labor force in the manufacturing area is inevitable, and that once jobs are lost they are gone forever. David Lewin, an economic analyst for the highly regarded Conference Board in New York City comments:

"Some of the jobs lost will be regained in a recovery from the recession—as is typical in all economic recoveries. However, the situation in manufacturing is not one of decline due solely to recession, but it is also the result of increased competition from abroad. Foreign producers are often more efficient than U.S. producers and have gained market footholds that will not be easily—if at all—dislodged.

While public attention has been focused on economic concessions, unions have made less conspicuous gains through trade-offs. Unions in the auto industry have led the way with experiments with "lifetime seniority" at a few plants and a "guaranteed income stream" to protect workers with 10 or more years of seniority in plants which are permanently closed, and to workers with 15 or more years of seniority in all other cases.

Such advances are usually placed on the agendas of other unions after time, and the food industry may one day soon find itself the target of such demands. Other recent concessions won by unions include prepaid legal expenses, and the extension of health insurance to laid-off employees for one and sometimes two years.

Another union strategy that has received little attention has been the coordinated bargaining approach to negotiations. By grouping several unions together, labor brings more clout to the bargaining table. In a recent settlement with American Home Products, Food and Commercial Workers were joined by Chemical Workers, the Oil, Chemical and Atomic Workers, the Steelworkers, and the Retail, Wholesale and Department Store Union.

Workers achieved generous gains through this method. The three-year contract provided 4,900 workers at 13 plants wage increases of 7 percent in the first and second years and 5 percent in the third; pension improvements, including a 9 percent reduction in benefits for employees retiring at age 62 instead of the previous 15 percent; and an increase in benefits for pre-1980 retirees.

Recent major agreements

The following are the major provisions of recent settlements involving food industry employers and workers. Employer, union and number of workers covered are given:

Agripac, Salem and Eugene, Ore., Teamsters (3,500): Three-year agreement with 12.5 percent pay cut first year; cost-of-living increase second and third years if the cooperative's 240 farmers are not losing money on crops sold through the co-op; management will take no pay cut; 500 new employees hired during strike remain on job; union and company will have to agree before an employee is asked to submit to physical examination; workers with seniority can "bump" less senior employees to work weekends at overtime rates; settlement preceeded by two-week strike.

Keebler Co., Pa., Ga., Ohio, and Colo., Bakery, Tobacco and Confectionary (4,500): Two-year agreement provided 85 cents increase in November, 1983; two weeks paid vacation after two years (was three) credited service and four weeks after 12 years (was 15); increased life insurance and accidental death and dismemberment by $1,000; $550 (was $500) month pension benefits, based on 28 years service, increasing to $600 in August, 1984; previous age 55 requirement for early retirement lifted and employee may retire if age and years of service equals 80.

California Bakery Employers Association, Calif., Teamsters (3,200): increases negotiated included $18 week for drivers, $1/hour for transport; and 85 cents for inside workers.

Joseph Schlitz Brewing Co., various locations Teamsters (1,800): three-year agreement provided 85 cents increase retroactive to June, 1982, and additional increases of 85 cents in June, 1983, and 1984; settlement preceded by one-month strike.

Pet Inc., Dairy Div., Tenn., Ky., Va., N.C., S.C., and Ga., Teamsters (1,100): Three-year agreement provided various retroactive increases to hourly workers; increased vacation benefits; medical and life insurance coverage for mentally retarded and physically handicapped dependents; improved hospitalization and life insurance benefits.

John Morrell & Co., various locations, Food and Commercial Workers (3,000): terms patterned after the Armour Co. settlement (see above); in addition, rollback of 58-cents an hour cost-of-living adjustments added to wages since January 1982, and company agreed to rescind a notice to close the Sioux Falls beef and lamb departments; settlement preceded by 12-day strike.

Dried Fruit Industry, Santa Clara and San Jose, Calif., Longshoremen (3,600): in addition to various minimal hourly increases for workers, the union obtained increased dental, vacation and pension benefits; workers with more than 1,300 but less than 1,400 hours in an anniversary year will receive one-half of their vacation entitlement at time of layoff; $200 a year severance pay for employees having 10 years or service and $100 for those having less than 10 years.

Fluid milk and ice cream companies, San Joaquin and Sacramento Valleys, Calif., Teamsters (1,350): vehicle mechanics received a 65-cents an hour increase; plant service and employees 40-cents.

Low sodium foods: Where are we headed?

Representatives from industry, government, and academia voice their opinions on the merits—and the drawbacks—of low sodium products.

Sodium reduction: is it necessary, is it practical, do consumers really want it? Where exactly are we headed with low sodium products? These questions and many more were discussed at a symposium on "Sodium Reduction in Processed Foods" at Michigan State University March 29-30, 1983.

According to an FDA consumer survey, salt ranks second only to sugar as a food ingredient that people use the food label to avoid. Preliminary data from their latest survey also indicates that the proportion of the American population concerned with the amount of salt or sodium in their diet has exploded from less than 15% in 1978 to over 40% today. This is nearly a three-fold increase in the number of people trying to limit sodium consumption.

But do consumers really know what they want? They are requesting sodium labeling and low sodium products, but when it comes to purchasing these products, are they putting their money where their mouths are? Or, as some processors indicate, are they tasting the low sodium products and deciding that regular foods aren't so bad after all? Could the sodium issue be just a passing fancy that captivates the attention of the consumer for a couple of years until a new "villain" is discovered? After all, isn't sodium the "terrible ingredient" that replaces nitrites, cholesterol, and sugar, all spectres of the past? Will the

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ANITA L. NOLAN, Associate Editor

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sodium "fad" pass in a few years too?

What about the addition of salt at the table? Are companies spending millions of hours and dollars on the development of low sodium foods only to have consumers salt them at home? Can this be used to the processors' advantage? Campbell Soup Company, for instance, at one point test marketed soups with the "salt to taste" idea, and found some consumers to be very receptive.

Is it all worth it? While it is agreed that there is some relationship between sodium and high blood pressure, no one seems to be able to agree on the strength or depth of that relationship. And no one has yet proven how much sodium is essential, or how much is excessive. Since each body reacts differently to sodium, no one amount seems correct for everyone. Although it is agreed that the American diet has an excess of sodium, the extent of that excess is still uncertain.

What are food processors doing about low sodium foods? Although they are not yet a major business, low sodium food sales are growing faster than the regular formulations. In fact, several low sodium food groups showed triple digit growth in the one year period between 1981-82. But there are only three products with sales over $10 million, and they average less than 5% of the total sales in their respective product categories.

But there has been a dramatic increase in the number of low sodium products introduced. By an account in the *Washington Post,* fewer than five low sodium products entered the national market in each of the five years before 1982. But in 1982, more than 35 national brands (representing hundreds of items) were introduced, not including store brands. And so far, 1983 promises even more, with at least 18 new low sodium products recorded so far. Over 20% of the food products now carry sodium labeling, and the FDA hopes that this figure will increase to one-third by mid '83.

Much of industry's concern seems to be not so much that they have to put the money and time into developing low sodium products, but are they what consumers really want? Consumers are interested in low sodium foods, and will make an initial purchase (if the price is right). But if the food doesn't taste "right", the next trip to the store will find their shopping cart filled with the same old foods they've been buying for years. And all the time and expense for R&D will be for naught.

Consumer view on sodium

What factors affect consumers' purchases of low sodium foods? Odonna Mathews, consumer advisor for Giant Food, Inc., a regional grocery chain in the Washington, DC, area presented the consumer's story at the symposium.

Over the last few years, Giant has begun carrying more low sodium or no salt added foods in response to consumer requests. Mathews says that sales are lukewarm to moderate in most categories, but there are a few hot sellers. Why? The problems with most products are related to taste and cost.

Taste is critical, of course. The number of people willing to accept an unpleasant tasting product in or-

Reduced sodium cereals: A case study

Kellogg's
CORN FLAKES
Kellogg's
RICE KRISPIES
NO SALT ADDED
Kellogg's
LOW SODIUM PACK
NET WT 5.5 OZ 156 GRAMS

Corn Flakes and *Rice Krispies*—two of Kellogg Company's favorite cereals. Kellogg's has taken these old standbys and created low sodium versions in addition to their standard products. Why has Kellogg's decided to test market low sodium cereals? Diane L. Vratanina, manager of Kellogg's Food and Nutrition Communications Department, supplies some answers.

Vratanina indicates that the low sodium products are being test marketed for two reasons. First, to assess the level of consumer interest in low sodium cereal products, and secondly, to determine the consumer's willingness to act on that interest. In other words, are consumers really interested in low sodium products, and will this interest show up at the cash register?

Market research by Kellogg's indicates that ready-to-eat (RTE) cereals aren't generally perceived by the consumers to be high in sodium, nor should they be. RTE cereals contain a weighted average of about 192 mg. of sodium/l oz. serving, based on market share data. As a category, RTE cereals contribute about 1.9% of the sodium in the American diet.

The low sodium pack is being marketed in individual packages containing four individual servings of low sodium Corn Flakes, and four of low sodium Rice Krispies. These are packaged together with a clear plastic overwrap, and flagged with the words "No Salt Added" across the front. The price of the low sodium products is in the same range as the regular 8-pack.

Kellogg's chose the individual pack, two variety concept for introducing the low sodium products for several reasons. First, the individual pack provides portion control for people reducing their sodium intake. One serving of either cereal contains less than 10 mg. sodium. An equivalent serving of regular Corn Flakes contains 215 mg. sodium, while Rice Krispies have 185 mg. Secondly, the pack concept offers con-

Size and growth of low sodium foods (1981-82)

Low sodium line	Share of full category	Annual $ retail (millions)	$ growth latest 52 wks.	$ growth latest 12 wks.	full category $ growth latest 52 wks.
Butter	11.5%	92.1	+16%	+10%	+11%
Margarine	2.0%	30.7	+28%	+20%	+5%
Salt substitutes	19.8%	22.0	+247%	+537%	+13%
Lite Salt	5.9%	6.5	+24%	+25%	+13%
Canned vegetables	0.2%	5.5	+91%	+118%	+5%
Canned Tuna	0.4%	5.1	+6%	+7%	+8%
Peanut Butter	0.3%	3.3	+39%	+317%	+36%
Canned soup	0.2%	2.8	+133%	+243%	+6%
Salad dressing *(bottled)*	0.02%	0.1	+106%	+222%	+8%
Misc. items*	NA	0.6	+245%	+333%	NA
Total average	4.5%	$168.8	+33%	+47%	+9%

**Low sodium boullion, baking powder, pretzels, mustard, seasoning, sauces, tomato paste, pickles, canned meat, canned pasta.*
Data presented by Campbell Soup at Michigan State University's symposium on sodium reduction.

der to reduce their sodium intake appears to be low. And some products just don't taste as good as their salty counterparts. The products that have come out best in Giant's taste tests are those that use alternative flavorings and spices. They've found that you can't just take the salt out of a recipe or product and expect consumers to like it.

Price is playing an increasingly important role in influencing the amounts, types, and qualities of the foods that consumers will purchase. A study conducted for a major women's magazine found that the nutrition concerns so visible in studies made in the 70's have been surpassed by the cost of food. In the study, consumers indicate that cost now takes precedence over nutrition as a priority in food purchasing. And consumers can't understand why the low sodium products should cost more. Logic tells them that if you remove something from a product, it should cost less, not more.

The case against salt—and sodium in particular—began in the mid-70's when consumer interest in health, nutrition, and fitness increased. Consumers began reading more labels on foods, and became more suspicious of additives in their foods. As a result, the consumer of the 80's has a heightened awareness of sodium in the diet, and is suspicious of its value in many foods.

Giant estimates that 10-20% of their customers are on some type of special diet, most frequently a low sodium diet, but the number of customers interested in low sodium products or just reducing sodium in general is much greater than the 20% figure.

Why is sodium a concern?

Most of the concern with sodium is in regard to the relationship between dietary sodium and hypertension. The National Heart, Lung, and Blood Institute estimates that there are 60 million hypertensives in this country. In fact, one in every four Americans has significant or borderline elevations in blood pressure high enough to warrant medical monitoring. The excessive consumption of sodium by the American population has led to a concensus gradually emerging from the biomedical community that it would be prudent for Americans to moderate sodium intake. This opinion applies not only to the patient on a medically prescribed sodium-restricted diet, but also to the general population.

Uncontrolled high blood pressure can contribute to or even cause heart disease, strokes, and kidney

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sumers variety—variations of two of Kellogg's most popular cereals. Both Corn Flakes and Rice Krispies have all-family appeal, and are familiar names to consumers. Kellogg expects the products to appeal most to those consumers advised to restrict their sodium intake, and also to the growing portion of the population becoming increasingly aware of sodium.

Marketing considerations

The low sodium pack was introduced in November, 1982, in Florida, Cleveland, Pittsburgh, and the Baltimore-Washington, DC areas. Kellogg's had several reasons behind choosing these testing areas. Packaging was a prime consideration. Individual-size cartons are popular in all these markets.

Demographics influenced the choice of Florida. Since that state has a greater proportion of residents over 65, it also has a higher incidence of hypertension, when compared to the general population. This should result in a greater interest in the low sodium products. Since Pittsburgh, Cleveland, and DC/Baltimore are all fairly representative of the overall cereal consumption patterns in the US, Kellogg feels that good response to the products in these markets will indicate their appeal to people in other parts of the country as well.

Kellogg capitalized on the media's influence on consumers to communicate general information about sodium, its relationship to health, industry's response to consumer interest in sodium, and the creation of low sodium products to consumers. Vratanina represented Kellogg in a variety of TV, radio, and print interviews. Ads with 20¢ coupons were also placed in newspapers in the test market areas.

A true indication of how the products are fairing will take 6-9 months, but Vratanina adds that the low sodium cereals have been well received by the grocery industry and consumers during the introductory period. In addition to testing the low sodium pack in these four markets, Kellogg has introduced the individual units of the low sodium Corn Flakes and Rice Krispies nationally in the specialized food service market. They have also successfully reduced the sodium content of several RTE cereals without negatively affecting consumer acceptability.

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failure. It is believed that lowering sodium intake along with therapy such as weight loss and exercise can help many people bring their blood pressure down to within safe levels.

Estimates of the average daily intake of sodium range up to 6900 mg., which is probably more than 20 times greater than the physiological need. The upper limit of the safe and adequate daily intake range for sodium, as estimated by the National Academy of Sciences, is 3300 mg.

People in developed countries eat more salt than necessary, and much more than people living in tribal societies, according to Dr. Adam Drewnowski, assistant professor at Rockefeller University. While we consider it normal for the blood pressure to increase with advancing age, and for hypertension and cardiovascular disease to be leading causes of death, these changes don't exist in the numerous tribal societies that are still in existence. Although these societies differ from our own in many respects, much of the evidence suggests that salt intake is the major factor that accounts for these health differences.

The controversy over the role of salt in hypertension begins with the fact that most people do not become hypertensive with the level of salt found in the American or Western-type diet. This suggests that other factors beside salt are perhaps more important. Genetic susceptability is most often mentioned. Dr. Rudy Bernard, a professor in the Department of Physiology, Michigan State University, has looked at the way hypertensives respond to the taste of salt. He found that hypertensives with a low level of renin (a proteolytic enzyme of the kidney) in their blood consistently rated the taste of salt solutions more pleasant than nonhypertensives.

Another possible explanation for the relationship between sodium and hypertension lies in the body's mechanism for dealing with stress. It has recently been shown that the hormone ACTH, put out by the body in response to stress, increases the salt intake as well as increasing

FDA's position on sodium labeling

Dr. F. Edward Scarbrough, Chief of the Regulatory Affairs Staff, Bureau of Foods, FDA, presented the FDA's point of view on sodium labeling.

Under current FDA regulations, salt, the number one contributor of sodium in the diet, is considered generally recognized as safe (GRAS) for use in foods. In a technical review of NaCl by the Federation of American Societies for Experimental Biology, it was concluded that the adult intake of sodium in the U.S. is in excess of physiological need. The FASEB recommended that the general population reduce their sodium intake, that guidelines be developed for measuring the sodium content of processed foods, and that the sodium content of foods be labeled. This FASEB review provided the scientific basis for the FDA's sodium initiatives.

The FDA's sodium program includes five points: (1) sodium labeling, (2) voluntary reduction of sodium in the food supply, (3) consumer education, (4) monitoring the marketplace and consumer changes, and (5) legislation. According to Scarbrough, the FDA is not pursuing the legislative option until they have had time to fully evaluate the success of a voluntary program.

The main purpose of the labeling initiative is to provide information to consumers to help them moderate or control their sodium intake. In general, the proposed regulations require sodium content in nutrition labeling, define sodium related terms to ensure consistency with the marketplace, require sodium to be declared in terms of milligrams per serving, and provide for sodium labeling without full nutrition labeling.

The proposal requires a quantitative declaration of sodium content whenever a sodium or salt claim is made on the label. It also requires that the sodium content be a part of nutritional labeling whenever nutrition labeling is required or is provided voluntarily. According to Scarbrough, this provision is the most controversial issue in the proposal. The sodium content can be declared as part of nutrition labeling, or in isolation without full nutrition labeling. Whenever quantitative sodium content is declared, it is to be provided in milligrams per servings, in 5 milligram increments.

The proposal also provides for voluntary quantitative declaration of the potassium content within the nutrition labeling format.

Sodium descriptors

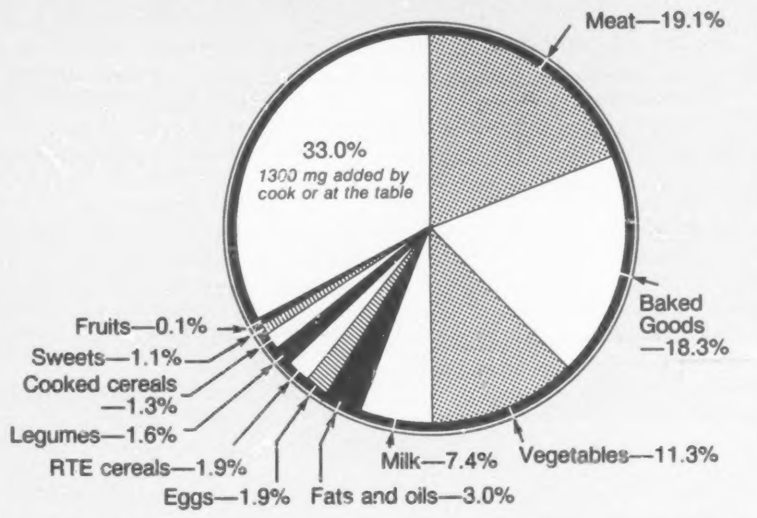
In the proposed regulation, the FDA has defined qualitative terms that may be used on the label to describe sodium content. (See accompanying chart). According to Scarbrough, the FDA has received many comments concerning these descriptors.

Many people feel that the term "moderately low sodium" is not particularly useful, because it could lead to consumer confusion. Many comments from industry indicate that the term "reduced sodium" is impractical because the required reduction is too severe, and not technologically feasible.

Scarbrough indicates that while the FDA is not proposing to establish regulations governing comparative claims concerning sodium content, they do want to insure that consumers are not misled into believing that an inconsequential reduction will provide significant

DISTRIBUTION OF SODIUM IN THE DIET:

Including Salt Used at the Table or By the Cook



Source: *1977-1978 U.S.D.A. Food Consumption Study, and 1979 S.C.O.G.S. Report: Evaluation of the Health Aspects of Sodium Chloride and Potassium Chloride as Food Ingredients.*

blood pressure. This is interesting, since stress is another factor proposed as a cause of hypertension.

If ACTH operates in people as this study implies, it could explain the correlation that is found between salt intake and blood pressure, and suggests that the stressful conditions of modern life may be the common cause of both our high salt intake and the high blood pressure and cardiovascular diseases of modern society. This suggests that we are predisposed to ingest more NaCl than we need, and that high salt intake is a symptom, rather than a cause, of high blood pressure.

Salt in baked goods

Rella Dwyer, director of administration-manufacturing services with the W. E. Long Company, a baker's cooperative, presented the problems of salt reduction in the

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health benefits. Their feeling is that manufacturers should use comparative label statements only in those cases where the sodium in a given product is being reduced by at least 10%.

The FDA's preliminary evaluation of the program's progress to date (in sodium labeling, lower sodium foods, and consumer awareness) indicates that their policy of an essentially voluntary approach is being met with a great deal of success. They feel that significant progress is being made toward each of their objectives. Scarbrough indicates that there is currently no evidence that an alternative approach, such as mandatory sodium labeling, is necessary to achieve the ultimate goal of moderating sodium consumption by the American public.

FDA's proposed definitions

Sodium free	foods with 5 mg. or less Na/serving
Low sodium	foods with 35 mg. or less Na/serving
Moderately low sodium	foods with 140 mg. or less Na/serving
Reduced sodium	foods that achieve, through special processing: —75% or more reduction in the Na content of the food it replaces —require comparative statement with food it replaces
Unsalted, no salt added, without added salt	These terms can be used only if: *—no salt is added during processing* *—the food it resembles, or for which it substitutes is normally processed with salt* *—sodium content is declared on label*

An industry response

How does industry feel about the FDA's voluntary approach? For at least one spokesperson, Rella Dwyer from The W. E. Long Company, the FDA's labeling proposal is seen as anything but voluntary. She claims that it may be touted as such, but when you get right down to it, labeling is required in many cases. For example, enriched white bread is covered by Standards of Identity, and must be labeled "enriched," by law. This is a nutritional claim, and so the bread must be labeled with nutritional information. Since the FDA proposes that sodium labeling is mandatory for all products now carrying a nutritional label, for the bread industry, at least, sodium labeling is mandatory, not voluntary.

Wondering if sodium labeling is really important, Dwyer says that the sodium content is to be printed in mg./serving, so that the consuming public can add up the mg. of sodium they take in at each meal. This, presumably, will give them some idea of how they are doing against an unknown goal. And it is all to be done without measuring the amount of salt added at the stove or used from the salt shaker.

She adds that the sodium issue is likely to end up in a marketing war. Company A can say "I have 290 mg. sodium in one serving of my product," while Company B can respond with "Look how much better I am, my product is so much lower, it contains only 280 mg." Unfortunately, the consumer doesn't know that 10 mg. doesn't mean much, especially when we don't know what the optimum intake should be.

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baking industry. Sodium reduction is particularly difficult in breads because of its varied functions.

First, salt controls the rate of yeast activity during fermentation, adding tolerance to the dough and preventing the development of wild types of bacteria growth.

This tolerance is important in achieving uniform product quality over the 20 minute period required to process a normal batch of dough. Uncontrolled fermentation causes variations in volume, grain, and texture from the beginning to the end of any single dough batch.

Salt's second function is its strengthening effect on the gluten. Gluten development is important for uniform grain and texture, and for dough strength.

One of the recent innovations in dough mixing is to hold the salt until the dough is almost developed in the mixer, which can reduce mixing times. This allows for faster, yet full development of the dough, but still allows time for the quick dissolving baker's salt to be thoroughly incorporated into the dough. This strengthening effect of the gluten can be achieved in other ways—by slowing down the production work flow, allowing the dough to go through the normal processing flow at a slower rate of speed where strength is not necessary. Dwyer adds that this will drastically cut the production rate, and will raise the cost of bread to consumers. Strengthening can also be achieved through the addition of chemical additives, or by using flour with a much higher protein strength level. Both of these methods will also add to the cost of bread, however.

Salt enhances the delicate flavor associated with bakery products. While there are many functional substitutes for NaCl, as a direct replacement, they taste terrible. Partial substitutes have shown some good possibilities, however.

Dwyer adds that recent tests have shown an actual preference for breads made with regular yeast food (which does contain sodium chloride), 0.5% sodium stearilactilate, and equal parts of 0.75% (baker's percents) of NaCl and KCl,

Long road to success with low sodium foods

Campbell Soup Company has a real commitment to produce low sodium products. It's obvious from their extensive research in the area. In fact, they began researching low sodium foods over 15 years ago. Barbara Shinn, Director of the Creative Food Center at Campbell Soup Company shared this review of Campbell's history with low sodium soups.

Campbell tracked responses mentioning excessive salt in consumer surveys from 1975-1980 for their condensed, chunky, and semi-condensed product lines. The level of responses mentioning too much salt doubled between 1978 and 1979, and held at the higher level in 1980. While the figures are still fairly low, they are getting close to what Campbell considers to be the warning level—10%. To satisfy the increasing interest in low sodium foods, Campbell has marketed low sodium products designed for those on salt restricted diets since 1964.

Tested in 1973

While Campbell has produced low sodium soups for over 15 years for those on salt restricted diets, they first began to consider marketing a line of reduced salt soups for the general public in 1973. At that time they conducted a marketing study to determine the degree of interest in reduced salt products. Salt restrictors constituted a small segment of the population (only about 8% at that point), and a study identified only 18% of hypertensive people as interested in purchasing low sodium products.

In a market test, consumers told Campbell that they disliked the low sodium products on the market at that time. Among low sodium dieters, those prepared products best accepted were peanut butter, margarine, and mayonnaise. Campbell's soups ranked very poorly in taste performance and price volume.

The study concluded that a major profit opportunity for large food manufacturers was not foreseen in low sodium products. However, it was noted that a marketing opportunity could develop based on two factors: continued publicity and pressure by government agencies to make Americans aware of high blood pressure, and growing concern by medical professionals about salt intake.

Tested again in 1976

In 1976, after considerable consumer research, Campbell tried a new concept in reduced salt soups. A line of no salt added soups with 30-130 mg. sodium/10 oz. serving would be offered that could be salted by the consumer. This idea was presented to consumers, and 25% particularly liked the idea of salting their own soups. Interest in the soups was twice as strong with those over 45 years of age. The soups received acceptable taste scores after they had been salted to taste, and good purchase intent was seen among older consumers.

Campbell decided to market the no-salt-added soup concept beginning in February, 1977, using a blue and white label to distinguish the product from the regular red and white line.

Research conducted after the start of advertising in each test area indicated a high level of awareness and heavy trial among salt restricting households, but little trial outside the salt restrictor segment. Further research—this time qualitative, indicated that the flavors were limited and unfamiliar, the products were priced at a premium (a barrier to family trial and expanded usage), there was no broad-based appeal, and there could be a possible backlash against regular used with either high fructose corn syrup at a 10% level and nonfat dry milk at a 2% level, or granulated sugar at 8% with no dairy product. Running very close in taste tests to these were breads made with a 60:40 ratio of KCl to NaCl, with very small amounts of fumeric acid, potassium glutamate, and monocalcium phosphate. None of these combinations resulted in any noticeable deviation of mix time, fermentation time, proof time, pan flow, or product uniformity.

What did this test work accomplish? The total sodium content was cut in half—a reduction of 56% sodium with no undesirable baking qualities. The dough cost was increased, however, by 0.08765¢/lb. At a medium-size wholesale bakery producing 500,000 lbs. of bread per week, this would be a yearly increase of $95,576 in ingredient costs.

Another possibility often suggested is to "clean up" the formula. Take out all sodium-containing ingredients, people say, and this will decrease the sodium content. But, since salt is the main source of sodium in bread, this substitution only reduces the total sodium content by about 10%.

What is going on in the baking industry right now? Several low sodium and no salt added breads are on the market. They represent less than 1% of the total sales for white bread.

Dwyer's question is, "If there is a market for low sodium bakery products, why don't they sell?"

"Product-wide" labeling

The feasibility of "product-wide" sodium declarations has aroused the interest of many food processors. A common figure for the sodium content of canned peas, for instance, can reduce the cost of the analytical work required to support declarations of nutrient content. R. P. Farrow, Senior Vice President and Group Executive for Research Laboratories of the National Food Processors Association, indicates that this may be possible for many products.

With the variety of sodium labeling problems, what circumstances, if any, would permit common sodium content declarations for all the products in one category? Obviously, for many products, "generic" sodium labeling is unfeasible or undesirable. It would not be applicable to many formulated products, for instance, and some manufacturers may wish to feature a low sodium content for competitive reasons.

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Campbell soups. The overall trial achieved 7% against a 13% objective. After careful consideration and continued less than satisfactory sales, the product line was withdrawn.

Tested again in 1978

In June, 1978, Campbell began to look at the salt issue on a broader basis: optimization of salt levels in the entire soup line. They sought to reduce the sodium levels to a point just above that where there is a decrease in acceptability. The conclusion of their studies was that there is an optimum level of salt that will have the highest level of acceptance for the greatest number of consumers. Acceptance will decline rapidly on either side of the optimum level. Their conclusion was that no salt was not the tactic to pursue, but reduced salt at optimum levels could result in broad-based appeal.

. . . again in 1979

But they continued to pursue the no salt added concept, looking at it once again in January, 1979. This time they used Miami as a test market for the no salt added products, with the following modifications. The familiar red and white label and traditional red and white flavors were used to prevent the specialty soup image. Four varieties best suited to the no salt added concept were formulated without salt. And red and white pricing was used so that there was no premiums to be paid. The salt levels ranged between 115-190 mg. sodium per 10 oz. serving, or 0.1-0.2% salt. The varieties included stockpot, tomato bisque, turkey vegetable, and chicken with dumplings. Coupons were distributed in stores and newspapers to encourage trials.

This test was also a failure. Sales were below modest objectives, and the product appealed mainly to a segmented market-salt restrictors. Even among them there was a serious flavor negative.

Later in 1979, a project was initiated to determine salt optimization of the major soup varieties. Flavor profile analysis and in-house sensory evaluation performance testing established the following: the salt reduction for acceptable flavor in the soups ranged between 12% and 20%, except for chicken noodle soup, for which no salt reduction was recommended. Campbell was at the point where they had to determine if the indicated salt reduction would lead to sustaining current sales of levels.

. . . and in 1980

In September, 1980, Campbell began marketing reduced salt soups in their North Carolina plant area. Salt content was indicated on the ingredient list in mg/100 gm. and mg/serving, but no other attention to salt was flagged on the label or with advertising programs. The salt levels for the soups was reduced as much as 35%. Sales performance for these salt-reduced soup varieties parallels standard varieties on a national basis.

Today, Campbell markets ready-to-serve red and white and chunky low sodium soups at 35 mg. sodium/100 gm. or less. The current sales projection for this low sodium line is well over 600,000 cases, but sales figures were running behind last year's at the beginning of March. Since this case volume is made up of seven varieties, sales are obviously still low. As a comparison, a good soup variety will sell 1-2 million cases or even more a year. Campbell feels that reducing the salt in their soups is a viable alternative, but they believe they must do better in developing more highly seasoned and flavorful reduced salt products.

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There are other instances, however, in which shared sodium information and "generic" sodium statements may be relatively easy to develop, or where product-wide sodium labeling may be desirable. Products naturally low in sodium that are canned, frozen, or otherwise preserved essentially as they are harvested, are logical candidates for generic labeling.

The sodium content of these products is subject primarily to natural variability. It can be quite variable, when considered in terms of their comparatively low average values.

One example of these products is apricots. Data indicates that over several seasons the sodium content of apricot halves in heavy syrup has averaged 6.2 mg./100g., with a standard deviation of 3.5 mg. per 100 gm. This variation exceeds 50%, when expressed on a percentage basis as a coefficient of variability. This is about twice the 25% coefficient variability that the FDA has stated in compliance policies. Farrow feels that while the 50% figure may be of regulatory significance, the physiological significance of sodium variability at these very low levels is certainly nil. It is presumed, Farrow says, that the FDA would, as they have in the past, exercise some discretion in enforcement policies in cases such as this. If that is the case, Farrow indicates that it would be fairly easy to arrive at generic label statements for many products of this type.

Sodium reduction in cheese

In natural cheese, salt controls ripening, firms the texture, and helps preserve cheese as well as season it. According to Dr. Robert C. Lindsay, a professor in the Department of Food Science at the University of Wisconsin, most of the salt in finished cheese is added in the production process, since much of the sodium inherent to milk is removed with the whey.

If cheese is unsalted, the resulting final moisture may be greater than the Standards of Identity will allow. The final unsalted product will also have a bland flavor, soft body, and greatly reduced shelflife.

Potassium chloride can be substituted for part of the NaCl to reduce the sodium yet give products a traditional flavor. Lindsay performed taste panels on cheddar containing 1.5% NaCl and 1.25% of a 50:50 KCl:NaCl mixture. When this product was compared directly to standard cheddar, there was a significant preference for the control. However, when single sample tests were made, the test product was found to be acceptable. He adds that most people don't seem to have such high expectations for cheddar that they are at all critical of the salt substitute.

This brings up an interesting point; the public is already used to a great variation in products produced in a natural fermentation like cheese. They don't have high expectations of getting exactly the same flavor each time. Lindsay adds that this expectation for variation can be an advantage to the processor when formula changes are made.

Sodium reduction in meat

Meat, poultry, and fish products contribute about 14% of the total sodium in the adult diet. While the fresh cooked versions of these products (without added salt) have less than 100 mg. sodium/3 oz. serving, their cured counterparts can contain four times this amount.

Dr. Albert M. Pearson, a professor in the Department of Food Science and Human Nutrition at Michigan State University, explained the purposes of salt in processed meats. Salt serves as a sea-

How salt can be reduced

It is estimated that as much as 50% of the national sodium intake is derived from salt or other sodium compounds added to foods during commercial processing. Another 25% is added during home preparation or at the dinner table, and the remaining 25% occurs naturally in foods. How can the 50% added by processed foods be reduced?

An understanding of the function of salt is important in identifying possible reduction methods. Dave Strietelmeier, national technical service manager for the Morton Salt division of Morton-Norwich Inc., reviewed the function of salt, then presented possible reduction concepts at the symposium.

First, salt acts as a seasoning. Saltiness is one of the four primary tastes detected by the taste buds in the mouth, primarily on the tongue. Saltiness is detected near the tip of the tongue, and bitterness toward the back.

Saltiness is detected relatively quickly compared to other tastes. Bitterness is a relatively slow sensation. Secondly, sodium chloride influences the solubility and water binding properties of globular proteins, an effect which varies with pH and concentration or ionic strength. Third, moderate solution concentrations of sodium chloride selectively inhibit microbial growth by high ionic strength or by lowering water activity.

Reducing sodium

Manufacturers have taken several approaches to reducing salt in processed foods. While some methods work, others are disasterous in terms of maintaining food palatability and acceptance. Strietelmeier presents two reduction concepts that have merit when properly implemented and controlled. Both are limited in that they will only partially reduce the requirement for salt, and neither is universally applicable to all types of food formulations. But each method can significantly reduce the sodium content of some moderately salted foods without sacrificing consumer acceptance. The first concept involves formulation tech-

Purchase of low-salt type products

	% OF TOTAL	% OF THOSE WHO HAVE BOUGHT
YES—Someone in household		
has bought	49	
regularly	13	27
only sometimes	22	44
hardly ever	13	27
one time	1	2
NO—no one has ever bought	46	
Not sure/can't remember	4	
	99	100

Source: FDA

soning, enhances water retention, texture, and color, dissolves protein for producing emulsions, and acts as a preservative. This last function is particularly important with limits in the use of nitrites.

According to Pearson, there are two ways to reduce the sodium in processed meats: by substituting other salts, and by reducing the levels of NaC1 used. The salt reduction is limited to the amount necessary to insure safety and maintain all the functional traits of the product.

Pearson adds that a mixture of NaC1 and KC1 seems to work best in many cured products. Up to 50% KC1 has been used in frankfurters without any noticeable decline in sensory scores. This 50% reduction would reduce the sodium content of the frankfurters by 35%.

USDA's position

What is the USDA's stance on sodium labeling? Ron Brewington, Chief of the Labeling Branch, FSIS, USDA, indicates that their position on sodium labeling is based on a four point program presented in Congress by the Assistant Secretary of Agriculture. The four points are:

(1) To monitor the sodium content of meat and poultry products under the USDA's jurisdiction. The thrust of this program is to determine the amount and range of sodium in meat and poultry products. Salt and potassium are also included.

They are also trying to determine the trend for sodium, salt, and potassium content in foods over the next few years, and to find a useful correlation between the sodium content and salt content to reduce the analysis costs involved with the study. The USDA is taking a "Dow Jones" approach in monitoring over 1100 product classes. Nine product classes have been selected for consideration.

(2) To provide information to the public about sodium in the diet.

(3) To initiate research to develop safe and palatable reduced sodium meat and poultry products. Their goal is to reduce the sodium in meat and poultry products while maintaining the safety and quality of these products. Sodium substitutes are also being considered.

(4) To encourage the industry to broaden the use of sodium labeling and market a wide array of low and reduced sodium foods.

While the USDA doesn't have any regulations concerning sodium labeling at this time, their policies are:

Sodium labeling is voluntary. If any claims about the sodium or salt content are made, there must be a disclosure of the amount of sodium in the food, and this must be in 5 mg./serving increments. If a product is nutritionally labeled, sodium

(Continued on next page)

niques to intensify saltiness, the second involves a partial substitution of KCl for NaCl.

Efficiency of salt

Strietelmeier says that the maximum intensification of saltiness might be called the "more bang per ounce" approach. Salt levels can be reduced by as much as 30 percent in certain formulations without sacrificing taste intensity or flavor. This can be done by simply altering grade selection, formulation, or application method.

Decreasing particle size results in a proportional increase in dissolving rate. Rapid solubility and dispersion of salt can result in a greater perception of saltiness in certain foods in which salt is incorporated in the dry form. Exposed surface area and thus dissolving rate is also affected by crystal form.

Another intensification method is with traces of bitter inorganic salts such as $CaCl_2$, $MgSO_4$, and $MgCl_2$. These can be present as impurities in salt, hard water, or in other food ingredients, or they may be deliberately added for their effect. Controlled addition in preferred, since impurities vary in the salt and hard water, varying the saltiness.

A number of inorganic salts have been studied as possible replacements for NaCl. Most are either too bitter, toxic, or unstable to be used in appreciable amounts, though they might be employed for intensification.

Only KCl approaches the saltiness intensity of NaCl, although it has a bitter, lingering aftertaste. This bitter note can be masked to a certain extent, however. The first rule is to use enough of it (20% of the normal NaCl levels), because the bitterness of KCl tends to drop off with increasing concentration as saltiness increases. Obviously, saltiness is masking bitterness.

Secondly, don't use too much, and keep some NaCl in the formula to mask the bitter flavor. More than a 50% substitution with totally acceptable flavor is not likely in most foods.

Examples of Quantitative Sodium Labeling in the Retail Food Supply

	Percent of Sales Dollars Sodium Labeled		
	1978	1980	1982
AVERAGE—ALL FOOD GROUPS	7.5	13.9	18.9
Baking needs	7.2	9.4	51.8
Baking Mixes	18.8	45.4	75.6
Desserts	0	0	26.2
Frozen vegetables	0	0	25.0
Flour	33.2	38.3	63.0
Cracker and breading products	0	0	20.1
Frozen fruits	0	0	19.8
Prepared foods	3.2	2.3	15.5
Cereals	27.7	84.0	97.8
Baby foods	0.7	22.9	38.4

Source: FDA

information does not have to be present. (This is a departure from the proposed FDA regulations.) If sodium information is provided, it would not trigger full nutritional information.

If a claim is made saying "no salt added" or "processed without salt," the USDA's only stipulation is that no salt, no NaCl, and no ingredient containing NaCl be used.

The USDA has no definition for "sodium free," since most meat and poultry products inherently contain 50-75 mg. sodium. The terminology "low sodium" can be used with products containing no more than 35 mg./100 gm. of product. Comparative claims are encouraged, but there should be a 25% difference in the sodium content.

The USDA has also implemented the "Partial Quality Control Program." This program has been initiated to assure that label statements remain accurate. It requires that industry provide the Department with a written description of how they intend to assure accuracy in sodium declarations over time. The description should include information on formulation and processing controls to be used, and a number of verification analyses.

Since the program is considered burdensome, the USDA has been looking for ways to streamline it. They are now willing to accept recognized reference sources such as Handbook 8 and possibly calculations based on the sodium contained in the individual ingredients as proof of the total sodium content. While these procedures won't work with every food, they can be used with many simple products. Brewington adds that the USDA is also receptive to the use of industry and company data bases. Even in those cases where the Partial Quality Control Program is necessary, steps have been taken to reduce the verification testing burden.

So how is the USDA doing? The number of companies monitored by the USDA that are involved in sodium labeling has increased steadily, in fact some of the larger companies now have their total product line sodium labeled. But Brewington indicates that there is still a long way to go. He adds that Congressional interest in mandatory labeling has not waned. As a matter of fact, on the very first day of the 98th Congress, a bill was reintroduced requiring mandatory sodium labeling.

Reformulation suggestions

What steps can be taken to improve your chances in the low sodium market? Richard A. Bennett, manager of technical service for the McCormick-Stange Flavor Division of McCormick and Co., Inc., suggests first and foremost, not to expect miracles. While it is possible to maintain good flavor with a moderate salt reduction (about 50%), expecting to duplicate the flavor in those products designed to contain less than 35 mg. per serving is unreasonable.

In fact, he suggests that you not panel the low sodium product against the standard containing normal amounts of salt. This can result in a substantial reduction in flavor acceptance. His suggested alternative is to panel the low sodium products against similar low sodium foods on the market. Bennett suggests that developing a product that is significantly preferred over a competing low sodium product would be a realistic goal.

A practical suggestion often ignored is to panel the food as it is eaten. If you are developing a low sodium frankfurter, don't panel it as is, but put it in a bun, add mustard and ketchup, and eat it. You can even imagine yourself at a baseball game. This will provide a truer indication of the product's acceptability.

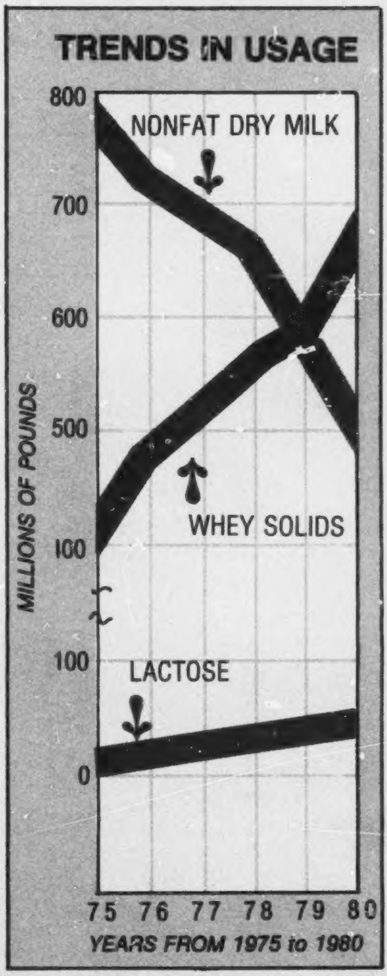
And—beware the "loaded" attribute. Dr. Adam Drewnowski, Assistant Professor of the Laboratory of Human Behavior and Metabolism at Rockefeller University, describes this as an ingredient (such as salt or sugar, that is subject to a health bias. When working with a product that contains one of these ingredients, remember that the product consumers say they want may not be the one they really prefer, or will buy. In any research that deals with a "loaded" issue, be sure to distinguish between the ideal product, actual consumer behavior and liking for the product, and purchase intent.

As if all this weren't enough, sodium reduction may not be a one time thing, but rather an on-going project that changes the product over time as the consumers' perception of it changes. As consumers eat less salt, they may see products that were once acceptable as too salty, even though the products haven't changed. If the low sodium trend continues for the next few years, products may have to be continuously evaluated and changed to prevent them from becoming "too salty" and losing sales.

In the final analysis, are low sodium products worth the trouble? The best indication of this may have come in a simple show of hands. For when the attendants at this symposium (many of whom had argued in favor of sodium) were asked if they had reduced their sodium intake in recent years, a definite majority raised their hands. FE

Outlook for whey as an ingredient

Usage increases steadily, and new technology may create additional markets.



The use of whey solids as a commodity food ingredient has steadily increased as a direct replacement for non-fat dry-milk in the U.S. food manufacturing industry. Despite significant gains in the amount of whey being processed, more than 40% of currnt whey production is still disposed as raw whey. Much of this represents the production of small plants where the cost of purchasing and operating processing equipment, as well as the subsequent transportation and handling costs, clearly exceed the value of any whey product which might be produced. In the case of small plants, the lowest-cost expedient remains some form of disposal, be it municipal treatment, spreading raw whey on local farmlands for its nutrient value, or feeding it to local livestock.

Whole dried whey

The remaining whey, roughly 56% of total production, enters the whey processing industry and is converted into some form of whey product for commercial utilization. By far the single largest use of whey solids (75% of total whey solids utilized) is in the form of whole dry whey.

This is whole whey that has been condensed by evaporation and spray dried to a powder or used directly in wet blends with other liquid ingredients that are subsequently condensed and spray dried. These whole dry whey and powdered whey products are marketed as commodity ingredients for a variety of food and animal feed applications.

At the other end of the spectrum, a very small percentage of utilized whey (2%) is demineralized by ion exchange or electrodialysis prior to spray drying to produce dry deminealized whey for specialized uses. These include whey protein-based infant formulas and other medical-nutritional products that require lactose and the special nutritional quality of the lactalbumin and lactoglobulin that make up whey protein but cannot tolerate the high mineral content in whole whey solids.

Lactose from whey

The remaining 23% of utilized whey solids is divided between two distinctly different process operations, each of which results in the production of lactose with important economic differences. The major portion of these whey solids (14%) continues to be dedicated to the production of refined lactose by use of the classical lactose manufacturing process developed by the infant formula industry. In this process, refined lactose is produced as the primary end product by chemically precipitating the protein and minerals to form an insoluble sediment that can be mechanically separated from the pure lactose serum.

This lactose serum is then crystallized, refined, and air dried to

(Continued on next page)

A. A. TEXIEIRA, University of Florida
D.E. JOHNSON, Arthur D. Little
R.R. ZALL, Cornell University

produce either pharmaceutical or edible grade lactose. The protein-mineral precipitate, known as delac or delactosed whey, is dried and sold as a by-product for animal feed. It has limited application as a food ingredient because of the high mineral salt content and the non-functional (insoluble) property of the fully denatured whey protein.

Ultrafiltration: Growing rapidly

The remaining 9% whey solids are processed through ultrafiltration, a relatively new membrane separation technology that has become a rapidly growing segment of the whey processing industry. In this process, a highly functional whey protein concentrate (WPC) is produced as the primary end product for a wide variety of food ingredient applications. A lactose permeate stream, rich in dissolved lactose, is produced as a byproduct of ultrafiltration, and serves as an economical source for the production of refined lactose; or it can be condensed and sold for use as an animal feed supplement or fermentation substrate when lactose production is not economically attractive.

Because of the higher value of whey products produced through ultrafiltration, essentially all new lactose production capacity brought on-stream in the U.S. since 1978 is part of the byproduct utilization of lactose permeate from ultrafiltration operations to produce whey protein concentrates.

Lactose prices

Although lactose prices have fluctuated widely over the years as a function of supply and demand imbalances, the cost to produce lactose is relatively fixed to the costs for labor and energy to carry out the necessary unit operations for lactose production and byproduct recovery. With current U.S. lactose production in excess of domestic demand, lactose prices have fallen steadily from over $.30 per pound in 1980 to a range of $.18 to $.20 per pound in 1982.

At those prices, lactose producers who use the classical process to manufacture lactose as a primary product with animal feed delac as a byproduct are operating at little or no profit. In contrast, whey processors who are producing lactose from ultrafiltration permeate as a byproduct from their manufacture of whey protein concentrate, are able to realize substantial net profits.

Total lactose utilization in the U.S. remained essentially steady from 1975 to 1978 at just over 100 million pounds. Since then, however, there has been appreciable growth in lactose utilization (reaching an estimated 168 million pounds in 1981), largely as a result of export sales, mostly to Japan and Canada, and steady new growth in infant formula utilization. Setting aside export sales, however, it is clear that the domestic market for lactose in the U.S. is quite limited, and becomes easily saturated when new production capacity comes on-stream.

The projected growth of the domestic lactose market over the next few years shows a total demand of 210 million pounds by 1986. Export markets for lactose face stiff competition with exports from Western Europe, Australia and New Zealand.

Whey protein concentrate

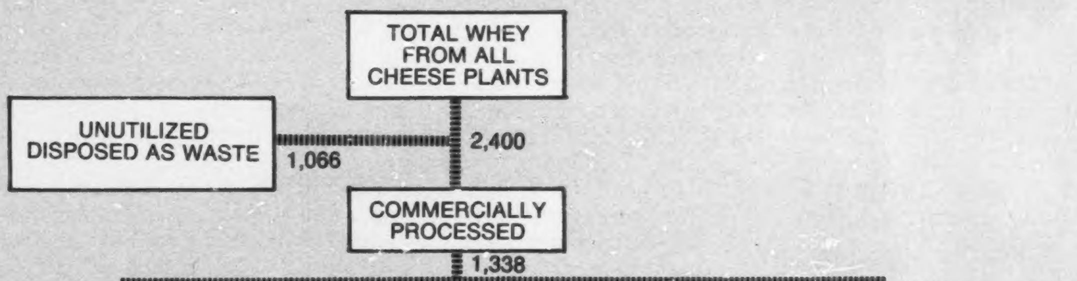
Whey protein concentrate is produced by ultrafiltration. Dissolved lactose and mineral salts pass through the membrane with the permeate, while the protein along with some of the lactose and mineral salts become increasingly concentrated in the retentate which remains above the membrane surface.

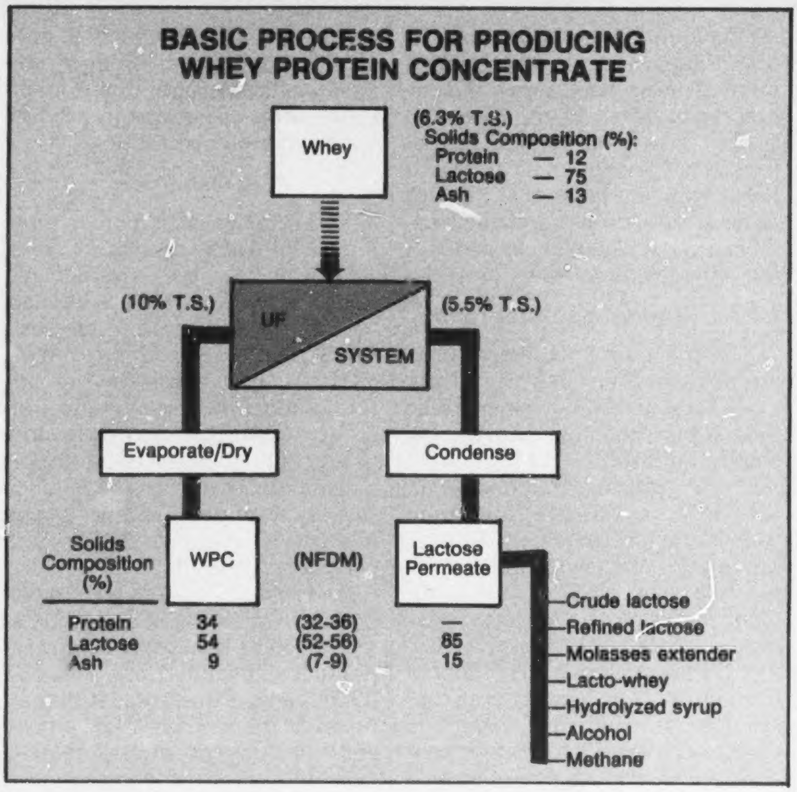
Whey protein concentrate is the

(Continued on next page)

TOTAL U.S. WHEY SOLIDS PRODUCTION

(millions of pounds solids in 1981)





retentate taken from the ultrafiltration system when the protein level has reached approximately 34% of the retentate solids. At this level of protein, WPC has an approximate composition equal to nonfat dry milk. Differences lie in the mineral profile of the ash content and in the type of proteins (lactalbumin and lactoglobulin in WPC, and mostly casein in NFDM). More importantly, the whey protein remains undenatured; it is highly functional (soluble over a wide range of pH), and has superior nutritional quality.

By extending the ultrafiltration process, the level of protein in WPC can be increased further, but at added processing cost, to approach the levels found in casein and egg albumin (80%) for applications with little tolerance for lactose.

The liquid permeate, which is produced as a byproduct of the ultrafiltration process, is rich in dissolved lactose. There is growing interest in the use of this permeate as a feedstock for alcohol production. However, most of the permeate that is generated from current WPC operations is being used in the production of crude and refined lactose.

The principal advantage of WPC is its price, while the principal limitations are its performance and quality when compared to casein and egg albumin. More fundamental, however, is that WPC appears comparable in most respects to nonfat dry milk at less than half the price. Thus, the market appears most interested in WPC as a substitute for nonfat dry milk; and to a lesser extent, as a replacer for casein and egg albumin.

WPC market opportunities

The total market potential for WPC as a replacer for NFDM is estimated at 200 million pounds, or approximately 30% of the current NFDM market. As a replacer for casein and egg albumin, WPC is not expected to replace more than about 15% of the combined market for casein and egg albumin, or approximately 20 million pounds.

Because of the unique functional properties of WPC, there may be significant market opportunities in new product applications that fall outside of existing protein markets. For example, the solubility of WPC at low pH allows it to function in acid foods and beverages where NFDM and casein cannot. This opens the door to the use of WPC as a source of protein in such products as fruit jams, jellies and preserves, fruit juices, carbonated beverages and other soft drinks.

These are products with high per capita consumption that normally contribute little or no protein to the diet. Considering beverages alone, if fortified drinks were to penetrate just one percent of the fruit juice and soft drink market, they would make use of nearly 90 million pounds of WPC per year.

New technologies

Membrane separation processes in the form of ultrafiltration and reverse osmosis along with mechanical vapor recompression (MVR) evaporators and immobilized enzyme systems are relatively new processing technologies with considerable applications potential in the whey processing industry.

The most significant of these techniques, however, is the use of ultrafiltration membrane systems to fractionate liquid whey into its two important constituents, protein and lactose. Although whey ultrafiltration has been in commercial use in the U.S. since 1972, the industry has been slow to adopt it. This is because the primary use of ultrafiltration was to produce a whey protein concentrate that would be sold much more profitably than whole dry whey. However, the process generated a lactose permeate byproduct stream which created a waste disposal problem equal in magnitude to the disposal of whole raw whey that was prohibited by environmental regulations. Potential applications for this lactose permeate are described in the article, "New Uses for Lactose Permeate," which appears on pages 110 and 111 in this issue.

This article is adapted from the authors' presentation at the 1982 Winter Meeting (December 14-17) of the American Society of Agricultural Engineers.

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FOOD PACKAGING

Chilton's Food Engineering

June 1983

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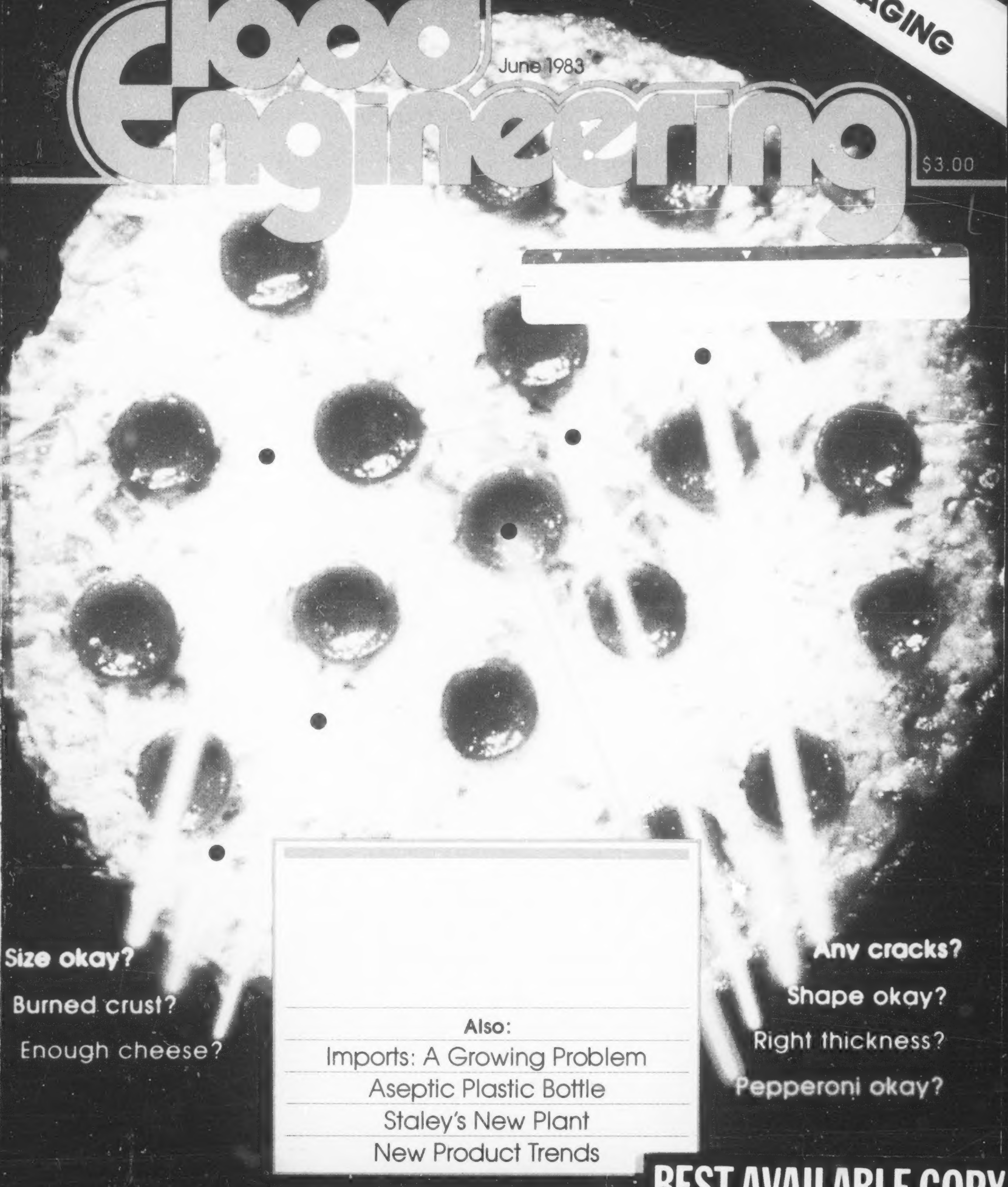
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Burned crust?
Enough cheese?
Any cracks?
Shape okay?
Right thickness?
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Also:

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Aseptic Plastic Bottle
Staley's New Plant
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Chilton's Food Engineering

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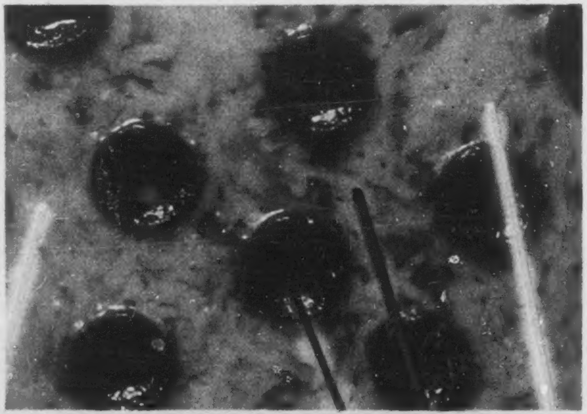

COVER STORY: On-line inspection systems are about to do the "impossible." The result will be significant savings in labor and extraordinary quality control.

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ASEPTIC PLASTIC BOTTLES: A blowmolding/filling/sealing system from Europe offers some interesting possibilities. Packages can be virtually any shape and are produced at rates up to 24,000 per hour.

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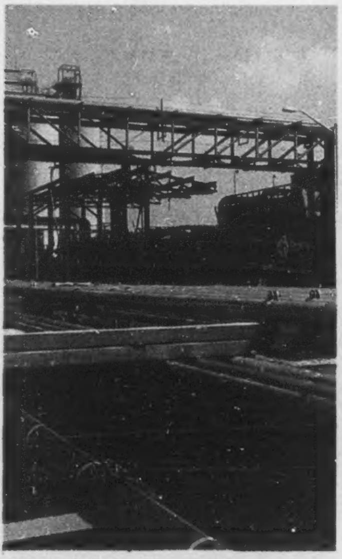

STALEY'S NEW PLANT: This huge plant just came on-stream to produce fuel alcohol and high fructose syrup.

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FEAST for ONE

SEAGRAM GOES FROZEN: The king of distilled spirits, Joseph E. Seagram, is testing a line of gourmet frozen dinners.

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Rollins
Rollins

HANDLING & DISTRIBUTION: This month, special emphasis is given to materials handling and distribution. Along with descriptions of new equipment, 10 articles describe how food companies are taking advantage of the latest techniques.

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FOOD ENGINEERING® (ISSN 0193-323X) June 1983, Vol. 55, No. 6. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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Update: New Product Trends

For the fourth year in a row, the number of new product introductions was on the rise.

New product activity for 1982 was high. Nielsen recorded 6,452 new item entries for this year, up 5.5 percent from 1981. According to the accompanying chart, items from established brands entering new fields was the biggest contributor (against the 7-year average), showing a 60 percent increase. Totally new branded items and the item proliferation category also had an above average year showing a +8 and a +17, respectively, against the 7-year average.

The term item proliferation refers to all of the established brands adding new items to their lines in their existing categories. Some observers of the new products scene argue that item proliferations should not be considered in the new product category at all, since they are not *really new products.* If Nielsen had agreed with that point of view, we would not have considered as new, developments such as Post adding raisins to their Grape Nuts, Oscar Mayer adding cheese to their weiners, or Kraft offering Velveeta cheese slices. These items are not only new, but are significantly new. They are all successful.

There were item proliferations among the newer brands as well during the year, and General Mills had two of the most successful: Yoplait custard style yogurt and Nature Valley granola bars with fruit fillings.

K. O. CARLSON, Vice President,
A.C. Nielsen Company,
Northbrook, Ill.

However, new *item* activity only tells part of the new products story. As can be seen by reading the accompanying new *brands* chart, the healthiest new brand years have almost run counter-cyclical to the health of the economy as a whole. 1982, a recessionary year, was an above average new brand year.

A new frozen novelty called Jello Pudding Pops is typical of those that qualified as an "established brand in an entirely new field." Another good example here is Pepperidge Farm entering the frozen sandwich category with their line of Deli's. These two products are pioneering efforts in an otherwise nonpioneering year.

In the "established brand entering an allied product" segment, Hills Bros. decaffeinated coffee, and Minute Maid apple juice are two of the more successful products included.

In the "totally new brand" category, two examples represent growing trends in today's marketplace: No Salt and Capri Sun. No Salt, a seasoning substitute product from Norcliff-Thayer, responds to the trend towards lower sodium products. Capri Sun, Shasta's natural fruit drink in a pouch, is a good example of the growing new aseptic packaging development.

Mfr's viewpoint

Looking at new product introductions from the manufacturer's point of view in 1982, a recession year, it seemed to Nielsen that they were most often saying, "Let's make the most of the consumer confidence in our products we have already established out there rather than elect the more risky and expensive pioneering course." Even when they did innovate, it seemed they did so carefully. In the case of General Foods, they were able to build on the successful Jello Pudding name when originating their new type of frozen novelty, Pudding Pops.

Consumer's Viewpoint

From the *consumer* side, what did it seem they were asking for? Well, most clearly, more products with less salt. This is a trend which began in 1982 that will surely develop further. According to *PREVIEW*, Nielsen's new product newsletter, about nine brands relating to reduced sodium are being introduced every 30 days.

Low-sodium products may be only part of a larger trend, however. Actually, with concern for sugar and caffeine in the diet continuing, we could lump together a vast array of products, which might also include the "natural ingredients" phenomenon, into one large group that could be labeled the "good for you, or at least better for you than what's already out there" trend.

Another emerging trend appears

(Continued on next page)

to result from an effort on the part of some manufacturers to offer the consumer a packaging alternative. The consumers aren't asking for aseptic packaging, but the manufacturer is betting they will accept it if they perceive it to be convenient and a good value.

On the ethnic foods front, we saw Mexican foods as the most popular variety in 1982, followed by Oriental foods. This growth was especially pronounced in the sauce areas.

Product names

Do product names make a difference in a product's success? Nielsen can't say for sure, of course, but consider: The name Lean Cuisine essentially describes the product, does it in two words, and in rhyme. We'd guess this name was a factor in that product's success. But what about the designation "homestyle"? It was on two different 1982 successes, Ragu's "homestyle" spaghetti sauce, and Ore Ida's "homestyle" frozen potatoes. Did it help? It sure didn't hurt.

And where were all of these new products aimed in 1982? Were they a necessity for the consumer—or were they just an added "frill." The answer to this question is also not clear cut. Consider Lean Cuisine again. To the gourmet on a diet, this product could be the answer to a prayer—definitely a basic. But to the struggling housewife with three kids and a tight budget, it's probably a frill. Few new products are fortunate enough to be considered a necessity broadly across differing population groups.

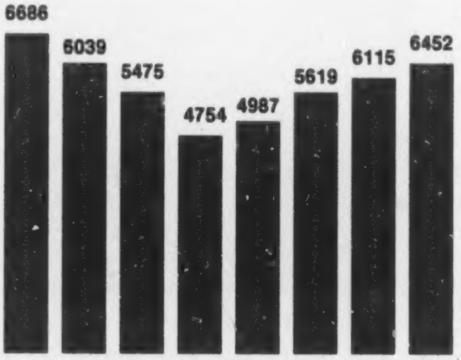
> **"In 1982 we identified 32 successes in the food products area alone, up from 24 the year before."**

Success rate

According to an A. C. Nielsen Company definition, a new product becomes a "success" when it first reaches a level of $15-million in retail sales after having been on the market 3 years or less. Test market time is counted as no more than one year in the total life of the product for this purpose. In 1982 we identified 32 such successes in the food products area alone, up from 24 the year before.

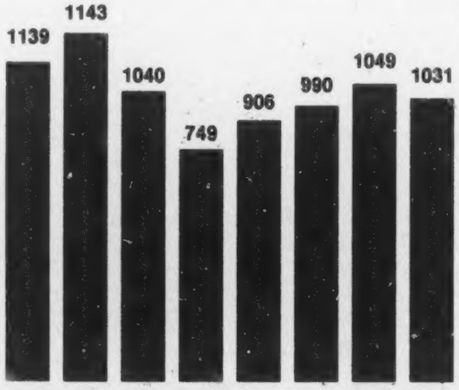
But what really makes a success? Obviously it takes a lot of skill on the part of a great many people both on the technical and marketing sides, and sometimes a little luck as well. But the manufacturers for all their creativity and cleverness, cannot perform miracles. With all of their talent and experience in the laboratory and the marketplace, they cannot entice consumers to buy a product they neither need nor want. More than once, that is. FE

Number of new items in grocery stores



Entries Into Allied Product Class	588	704	543	411	516	502	480	457
Established Brands In New Field	249	198	205	115	150	168	107	272
New Brand Items	1343	1207	1045	885	1047	1061	1298	1220
Item Proliferation Of Established Brands	4506	3930	3682	3343	3274	3888	4230	4503
	1975	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**

Number of new brands in grocery stores



Brand Entry Into Allied Product Class	329	397	324	216	293	306	322	269
Established Brands Entry Into New Field	143	122	110	69	76	97	60	151
Completely New Brand Name	667	624	606	464	537	587	667	611
	1975	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**

Huge plant for ethanol and HFCS

Staley's new plant in Loudon, Tennessee goes on-stream with some pretty impressive statistics.

When A.E. Staley Manufacturing Company started-up its new ethanol plant at Loudon, Tennessee last September, the company immediately vaulted from a non-producer of alcohol into third place among U.S. producers of anhydrous alcohol.

"Immense" is the immediate impression of the visitor to Loudon. The new ethanol plant is only part of a $250-million, 194-acre Staley corn wet-milling complex capable of turning-out 600 million lbs. of high-fructose corn syrup and 40 million gallons (264 million lbs.) of ethanol per year. Described by Chairman Donald E. Nordlund as the largest single capital project in Staley history, the plant boosts the company's annual corn-sweetener capacity to 4.5 billion lbs., of which HFCS capacity accounts for 3.5 billion lbs.

Yet—because of high-tech process control systems—few people are needed to control production of either HFCS or ethanol at any point in time. "The computer does most of the legwork," says Plant Manager Paul Herman.

Designed by Staley engineers, the new plant was built in just 22 months on a "fast track" schedule which minimizes lead time between engineering and construction. Much of the HFCS process design is based on that of Staley's corn wet-milling plant at Lafayette, Ind. (*FE*, July, '78).

CHARLES E. MORRIS,
Midwest Editor

One reason for locating the plant, in Tennessee, Herman points out, is proximity to major soft-drink bottlers such as Coca-Cola and Royal Crown Companies, both headquartered in Atlanta. From Loudon, Staley will supply soft-drink bottlers throughout the Southeast with HFCS and is currently supplying gasoline distributors in the same region with ethanol for gasohol.

(High-fructose corn syrup containing 55 percent fructose has replaced at least half of the sucrose in most soft-drink formulations. And on March 2nd, Coca-Cola announced that it raised the maximum amount of HFCS-55 allowed in its Coca-Cola fountain syrup from 50 percent to 75 percent of sweetener content. This should boost Coke's consumption of HFCS by about 250 million lbs. per year. Although this is a relatively small increase in a total HFCS market estimated at 6.5 billion lbs. for 1983, industry analysts expect Coke to eventually raise the HFCS content of its canned and bottled Coca-Cola as well.)

On April 21, PepsiCo announced that it will use HFCS 55 for 50 percent of the sweetener content in its bottled and canned Pepsi Cola and Pepsi Free—the last major soft-drink brands holding-out against high-fructose corn syrup. Pepsi had

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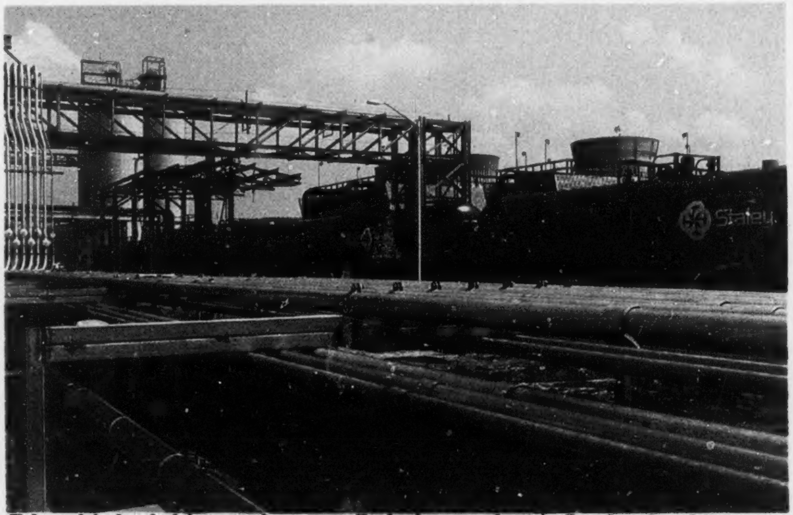


Ethanol is loaded into tank cars at Staley's new plant in Loudon for shipment to Southeastern gasoline distributors, who add ethanol to gasoline.

Entire ethanol process is computer-controlled from a central station by only two technicians. HFCS process is controlled from a similar station.

Alcohol distillation system at the new Staley plant. From left to right: Rectification column, beer still, dehydration column, and "heads" column.

NEW PLANT . . .

previously used HFCS only in its fountain syrup and Mountain Dew brand. Pepsi's move is expected to soak-up excess production capacity in the corn-sweetener industry and firm-up corn-sweetener prices. Start-up of HFCS production at Staley's new plant thus occurs with near-perfect timing.

At the time of *Food Engineering's* visit late in January, the plant was producing high-DE corn syrup as fermentation feedstock for ethanol production, with full production of the company's Isosweet 100 (42 percent fructose) and Isosweet 5500 (55 percent fructose) corn syrups started-up in March. The plant started shipping ethanol during the second week of September, 1982, after a four-month start-up cycle.

The new plant operates continuously—24 hours a day, seven days a week, 360 days per year—with four eight-hour shifts rotating 'round-the-clock. When fully operational, the plant will employ about 225 people.

Energy-efficient plant

Staley's new plant produces an oil-conserving product in an energy-efficient manner. The entire Loudon complex was designed for optimum yield at minimum energy cost. 'It's our most energy-efficient plant," says Herman. "And we get high reliability with the way things are tied together."

Examples: Process steam for both HFCS and ethanol operations is generated by two 200-psi capacity boilers fired by coal, lower in cost than gas or oil. (A third 200-psi boiler, which can be fueled by either gas or oil, is on standby for lighting-off whenever either coal-fired boiler is down for maintenance.)

Low-pressure steam for the beer still is supplied by reducing high-pressure steam through an induction generator, which simultaneously applies heat to the still and generates added electricity for the plant's main power grid. An electrically-powered mechanical vapor recompressor evaporates water from the "still bottoms" to recover solids used as feed ingredients.

Energy-saving systems such as these help cut energy consumption to a low 21,000 BTU's per gallon of ethanol produced. "We're recovering all the heat we can," says Herman. "We don't have to run our boilers at full capacity."

Adds Technical Manager Robert P. Jansen: "We're recovering 80 percent of the usable carbohydrate in the corn."

Another factor contributing to high operating efficiency: Recovery of marketable co-products. The wet milling process yields protein fiber and high-protein gluten meal—valuable feed ingredients—plus corn oil from germ. Corn gluten is further recovered from the beer still and also marketed as a feed ingredient.

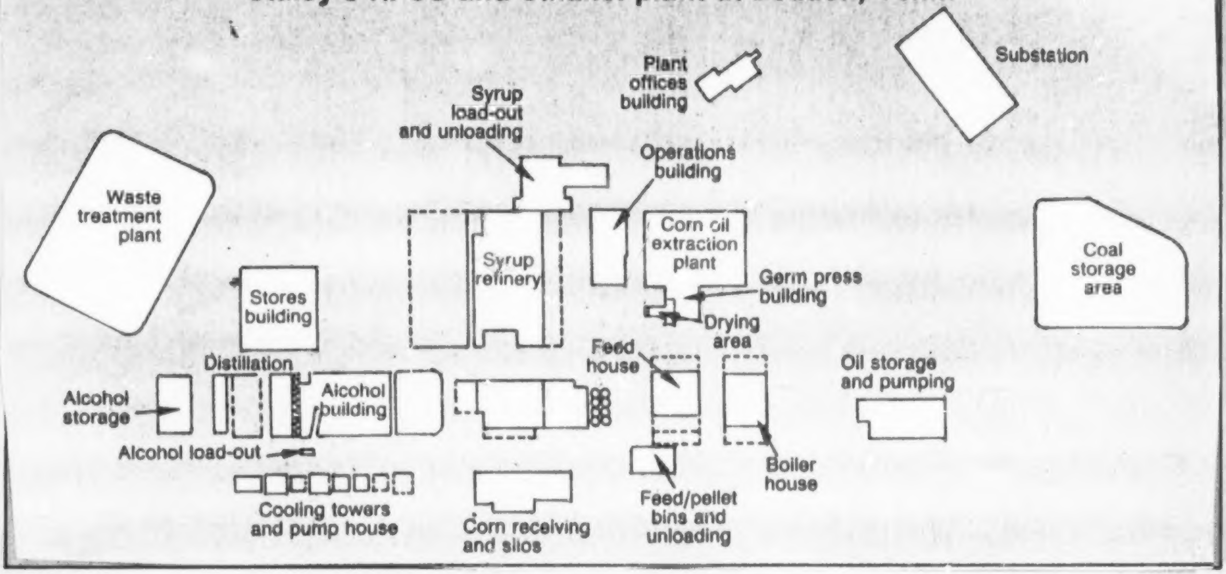
CO_2, a by-product of fermentation, is currently vented into the atmosphere but Staley is negotiating for its sale. Fermentation yields one pound of crude CO_2 for every pound of ethanol, and the company expects to soon market its CO_2 via contract refiners.

Grind 80,000 Bushels Per Day

Raw material for the corn wet-milling process is Midwestern corn, shipped to Loudon in 100-car unit trains carrying 300,000 bushels each. (A riverfront barge facility is a possible addition.)

Corn is first cleaned and routed to any of ten 44,000-gal. steep tanks

Staley's HFCS and ethanol plant at Loudon, Tenn.



in the steep house for soaking in SO_2 and water to soften the kernels. Steep water, which absorbs some nutrients from corn, is siphoned-off for sterilization and later addition to the fermentation medium as a yeast nutrient. Steeped corn moves to the mill house, which has a grinding capacity of 80,000 bushels per day, for separation of the corn kernel into its various components and recovery of co-products:

—Germ is separated through a mill and cyclone and routed to the germ press for pressing and hexane extraction of crude corn oil. Extracted germ meal goes to the feed house. Crude is sold or shipped for further processing to Staley's corn-oil refinery at Decatur, Ill.

—Fiber is separated through wedge wire screens and directed to the feed house for drying and pelletizing as a 21-percent protein feed ingredient.

—Gluten is separated from starch via centrifuge and also spun-off to the feed house for drying as 60-percent protein meal.

The resulting corn starch is pumped to the syrup refinery for saccharification by amylase and glucoamylase enzymes into 90+ DE (dextrose-equivalent) corn syrup.

At this point, the syrup can be directed either toward ion-exchange and immobilized enzyme columns for isomerization into high-fructose corn syrup, or into fermentation for conversion to alcohol.

Batch and continuous

Syrup designated as feedstock for the ethanol process enters one of eight 200,000-gal. stainless-steel batch fermenters for fermentation with a strain of *S. cerevisiae.* The fermenters are operated in staggered stages of regeneration and fermentation to maintain a continuos flow of "beer" to the beer still. Fermentation consists of five steps:

1. Sterilization: Steep water containing nutrients absorbed from corn is sterilized before it is added to the fermentation medium to prevent bacterial contamination of the yeast, which can reduce alcohol yields.
2. Feed: Yeast, sterilized steep water and other nutrients are added along with the dextrose medium to the fermenter.
3. Fermentation: Yeast metabolizes the sugars into cell mass, alcohol and CO_2 at temperature controlled between 85 and 95°F. Yield: 7 to 9 percent alcohol in 12 to 24 hours—highly efficient at today's state-of-the-art. (According to industry experts, typical fermentations yield 8 to 12 percent alcohol in 48 hours.) "We elected to run at a fermentation level where we get 8 percent alcohol to the beer still," said Herman. This level, combined with distillation design, offers optimum production efficiency, he added. Because fermentation is an exothermic (heat-generating) process, excess heat is removed from each fermenter by a plate-type heat exchanger and dissipated via a cooling tower.
4. Yeast recovery: After fermentation, each batch is centrifuged to separate the beer (alcohol/water solution) from the yeast slurry. Beer goes to the beer well—a huge surge tank of about 220,000-gal. capacity which maintains a constant flow of beer to the still—while the yeast cream spins-off into one of three culture tanks to await recycling into the next fermentation. A yeast batch can typically be recycled through the enclosed system for several weeks, says Staff Process Engineer Christopher S. Patterson.
5. CIP: Fermenters are cleaned-in-place with caustic solutions after each fermentation. Wastewater containing solids from the CIP sequence (as well as wastewater from other stages of the process) flows to the plant's waste treatment facility for pH adjustment and reduction of BOD and suspended solids before discharge to a municipal water treatment plant, newly built by the city of Loudon adjacent to the Staley complex. A spiraling "slope" design on the interior walls of each fermenter allows faster, easier CIP cleaning, Patterson points out.

(Continued on next page)

NEW PLANT . . .

Beer containing 8 percent alcohol flows continually at 600 to 900 gallons per minute into the still, where alcohol is stripped from water by heating the beer to a temperature above the boiling point of alcohol but below the boiling point of water, and solids are recovered for evaporation and drying in the feed house. Resulting vapors are condensed in the rectifying column to 94 percent (188 proof) alcohol. Next, longer-chain alcohols, acid aldehydes and organic acids with low boiling points—known as "heads"—are distilled-out in the "heads" column.

To break the azeotropic bond between remaining water and alcohol, the alcohol then goes through the dehydration column, where nearly all of the remaining 6 percent water is removed by a tertiary distillation process. (Benzene, commonly used in many ethanol processes, is not the azeotrope.) Result: Anhydrous alcohol of 199+ proof.

The ethanol is now routed to shift tanks where it is denatured with unleaded gasoline (2 to 5 percent by volume) and stored in one of two 300,000-gal. storage tanks to await loadout into tank trucks or rail cars for shipment to gasoline jobbers, who add the ethanol to gasoline to make gasohol.

Microchip control

All basic operations at Loudon—corn wet-milling, HFCS conversion, ethanol fermentation, distillation and loadout, energy generation—are computer-controlled and monitored via Foxboro Spectrum

Anhydrous fermentation ethanol fuel plants with capacity of 500,000 gallons per year or greater

City/State	Company	Anhydrous Ethanol Capacity Gal/Yr	Excess Anhydrous Capacity Gal/Yr	Primary Feedstock	Co-Product	Ethanol Storage Capacity -Gallons
Van Buren, Ark.	White Flame Fuels, Inc.	4,000,000	1,500,000	Corn	DDG	188,000
Fayetteville, Ark.	National Biofuels	500,000	100,000	Starch Waste	DDG	85,000
Selma, Cal.	Raven Alcohol Distillery	9,000,000	7,000,000	Molasses	—	60,000
Dixon, Calif.	Parallel Products, Inc.	750,000	—	AG Waste	—	15,000
Campo, Col.	Baca Food & Fuel Coop	1,300,000	—	Milo	DDG	50,000
Campo, Col.	Eugene L. Schroder Co.	750,000	—	Milo	DDG	25,000
Monte Vista, Col.	Colorado Agro-Energy, Inc.	2,200,000	300,000	Barley	DDG	200,000
Walsh, Col.	Colorado Gasohol, Inc.	3,500,000	1,000,000	Corn	Stillage	146,000
Brooksville, Fla.	Biochemical Energy, Ltd.	600,000	—	Brewery Waste	—	23,000
Douglas, Ga.	Southeast Georgia Agricultural Production & Development Corp.	2,200,000	200,000	Corn	DDG	32,000
Roberta, Ga.	Syncorp, Inc.	2,800,000	--	Corn	Stillage	115,000
Bliss, Idaho	Snake River Ethanol Co.	1,600,000	—	Wheat	DDG	80,000
Grant, Idaho	Beard Alcohol Farm Co.	800,000	300,000	Potatoes	Stillage	220,000
Pingree, Idaho	Spudcohol Co.	1,000,000	500,000	Wheat	Stillage	25,000
Decatur, Ill.	Archer Daniels Midland Co.	**				
Lanark, Ill.	Midstate Energy Resources	600,000	—	Corn	Stillage	22,000
Pekin, Ill.	Pekin Energy Co.	60,000,000	—	Corn	CWM*	**
Peoria, Ill.	Archer Daniels Midland Co.	**				
Bonaparte, Ia.	Van Buren County Alcohol, Inc.	2,500,000	—	Corn	DDG	42,000
Cedar Rapids, Ia.	Archer Daniels Midland Co.	**				
Sheldon, Ia.	Appropriate Community Tech. Co.	700,000	—	Corn	DDG	32,000
Storm Lake, Ia.	Farm Fuel Products Corp.	3,300,000	1,000,000	Corn	DDG	100,000
Atchison, Kansas	Midwest Solvents Co., Inc.	6,000,000	—	Milo	DDG	630,000
Garden City, Kansas	Reeves Agri Energy Co.	2,000,000	500,000	Milo	Stillage	70,000
Leoti, Kansas	Ese Alcohol, Inc.	650,000	—	Corn	DDG	23,000

systems similar to that governing Staley's new soybean oil refinery at Des Moines, Iowa (FE Mar., '82) and described by Herman as "a generation beyond" the Foxboro system guiding the refining process at Staley's corn wet-milling plant at Lafayette, Ind. The entire system was programmed by Staley engineers who "put thousands of manhours into the programming," says Herman.

Process control travels along two "highways," each controlled by a Fox 1A computer. One highway runs roughly across the bottom of the site plan shown in the diagram to link boiler house, milling and ethanol operations; the other travels across the top of the site to control corn syrup refining. A third Fox 1A ties the system together and facilitates communication.

The ethanol system is monitored and operated from a control center manned by only two technicians during any shift. A third technician "in the field" controls ethanol loadout from a remote terminal.

As described in *Food Engineering's* earlier story on Staley's soybean oil refinery at Des Moines, the Spectrum system consists of:

—Fox 1A, the microprocessor-based host computer which manages the process by monitoring in-plant sensors, calculating process adjustments required and adjusting process parameters via programmable controllers.

—Microspec, microprocessor-based digital controllers programmable via Fox 1A and each controlling a number of "loops," i.e., spe-

(Continued on next page)

City/State	Company	Anhydrous Ethanol Capacity Gal/Yr	Excess Anhydrous Capacity Gal/Yr	Primary Feedstock	Co-Product	Ethanol Storage Capacity -Gallons
Bardstown, Ky.	Fuel Alcohol	4,500,000	3,000,000	Wet Ethanol	Stillage	110,000
Louisville, Ky.	National Distillery Products Co.	6,000,000	—	Corn	DDG	570,000
Federalsburg, Md.	American Synfuels Co.	3,500,000	1,000,000	Corn	DDG	90,000
Bronson, Mich.	Jeritsma Farms	600,000	—	Corn	Stillage	30,000
Houston, Minn.	Alcon Industries, Inc.	720,000	180,000	Corn	DDG	15,000
Kasson, Minn.	Zumbro Valley Alcohol & Feed	800,000	200,000	Corn	DDG	39,000
Mankato, Minn.	G&S Gasohol, Inc.	1,500,000	1,500,000	Wet Ethanol	—	30,000
Melrose, Minn.	Kraft, Inc.	800,000	—	Cheese Whey	—	40,000
Morehouse, Mo.	Southeast Mo. Distillers, Inc.	1,000,000	300,000	Corn	DDG	80,000
Amsterdam, Mont.	A. E. Montana, Inc.	650,000	—	Barley	Stillage	74,000
Ringling, Mont.	Alco Tech. Co.	1,500,000	500,000	Barley	DDG	60,000
Roca, Neb.	Ecological Energy, Inc.	1,000,000	500,000	Corn	Stillage	40,000
Smithfield, Neb.	Deboer Bros. Renewal Energy, Inc.	650,000	100,000	Corn	Stillage	60,000
Clovis, New Mex.	N-M Energy, Inc.	660,000	—	Milo	Stillage	12,500
Jefferson, Ohio	Cochran Oil	850,000	350,000	Corn	Stillage	30,000
Southpoint, Ohio	Southpoint Ethanol Co.	60,000,000	—	Corn	DDG	4,000,000
Hydro, Okla.	Oklahoma Gasohol, Inc.	3,000,000	1,000,000	Milo	DDG	300,000
Loudon, Tenn.	A. E. Staley Mfg. Co.	40,000,000	—	Corn	CWM*	**
Edinburg, Tex.	Jonton Alcohol, Inc.	660,000	125,000	Grain Sorgum	Stillage	16,000
Muleshoe, Tex.	Charmec Energy Co.	750,000	—	Corn	Stillage	12,000
Doswell, Va.	Agri-Ethanol Chemicals Corp.	1,800,000	—	Corn	DDG	90,000
Reston, Va.	A. Smith Bowman Distillery, Inc.	2,880,000	2,880,000	Wet Ethanol	—	30,000
Bellingham, Wash.	Georgia Pacific Corp.	2,000,000	—	Lignin Liquor	Lignin	300,000
Olympia, Wash.	Olympia Brewing Co.	700,000	—	Brewery Waste	—	24,000
Warden, Wash.	Matrix Energy Company	2,000,000	500,000	Corn	Stillage	20,000
Greenleaf, Wisc.	TCV Alcohol Co.	1,200,000	—	Corn	Stillage	72,000
	Total	**246,470,000**	**24,535,000**			**8,324,500**
	Total ADM	**220,000,000**	**(Plants in Cedar Rapids, Ia; Peoria, Il; Decatur, Il)**			
	Total Capacity	**466,470,000**	**24,535,000**			**8,324,500**

Source: National Alcohol Fuel Producers Assn. *CWN (Traditional Corn Wet Milling By-Products) **Information Not Available

NEW PLANT . . .

cific pumps, valves, switches and other devices linked to the controller.

—Spec 200, analog controllers programmable via Fox 1A for controlling various support processes.

—Viedeospec, the centralized video displays for technician interface. The ethanol process control center at Loudon is equipped with two work stations, each incorporating three CRTs plus associated keyboards and printers. With Videospec, technicians can call-up a hierarchy of video displays, enabling him to proceed from an overall process display down to a specific loop so he can isolate and adjust production variables.

—Foxnet, the communications network which links all elements of the Spectrum system.

Management system

As at Des Moines, employees at Loudon are organized into a "participative management system" whereby teams of technicians manage their own areas of responsibility, rotate the watch in the control center, train new people, exercise hire/fire authority and even get involved in interviewing and selecting new employees. (More than 12,000 people applied for the 225 jobs at Loudon, said Herman.) Technicians are cross-trained to operate the process control system and perform various support functions such as plant engineering and maintenance, quality control and administrative. A continuous preventive-maintenance program is supported by a spacious maintenance shop situated in the operations building and equipped with extensive metalworking and metal fabricating facilities. "We can even make our own tanks if necessary," says Herman.

The plant's quality control lab continuously monitors all product standards, starting with incoming corn and water through every stage of the process to outbound ethanol, corn syrup, corn oil, feed products and wastewater. Quality tests in the ethanol process, for example, include checking dextrose content of fermenter feedstock, alcohol content of beer emanating from the fermenters, proof achieved at each stage of distillation and dehydration. In the refining process, similar tests confirm dextrose content and fructose content of corn syrups at each stage of the operation. To perform these functions, the lab is equipped with sophisticated tools such as gas and liquid chromatography.

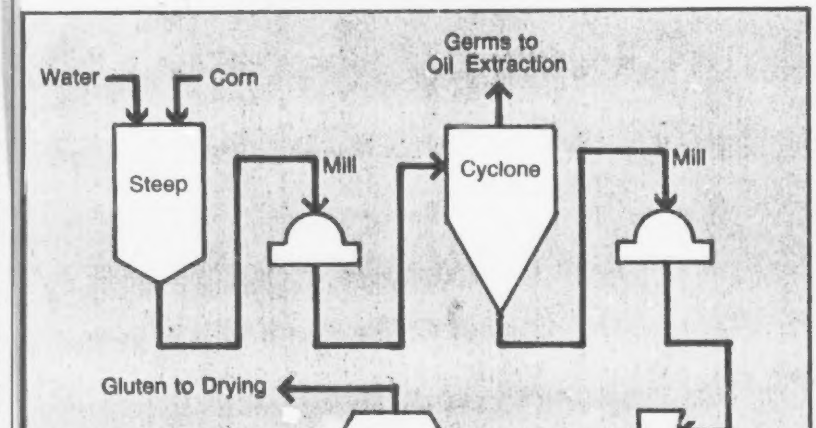
In addition to chemical and physical analyses, corn syrups and alcohol must meet organoleptic standards of in-house taste panels composed of plant technicians. A microbiology lab monitors fermentation performance of yeast cultures and checks for evidence of bacterial contaminants which can adversely affect yields.

Selling performance

All ethanol currently produced at Loudon is sold as fuel alcohol but it could be denatured in a variety of ways for other industrial uses as well, says Herman. Although the term "gasohol" has faded in popularity as a marketing label, demand for fuel alcohol is booming with increasing sales of ethanol-extended gasolines dubbed "super unleaded with ethanol" or "ethanol-enriched unleaded premium."

Alcohol is replacing lead as an octane booster, Herman points out. "Ethanol may be a gasoline extender," he adds, "but it's the performance value that's being marketed today!" FE

Staley's Ethanol Process



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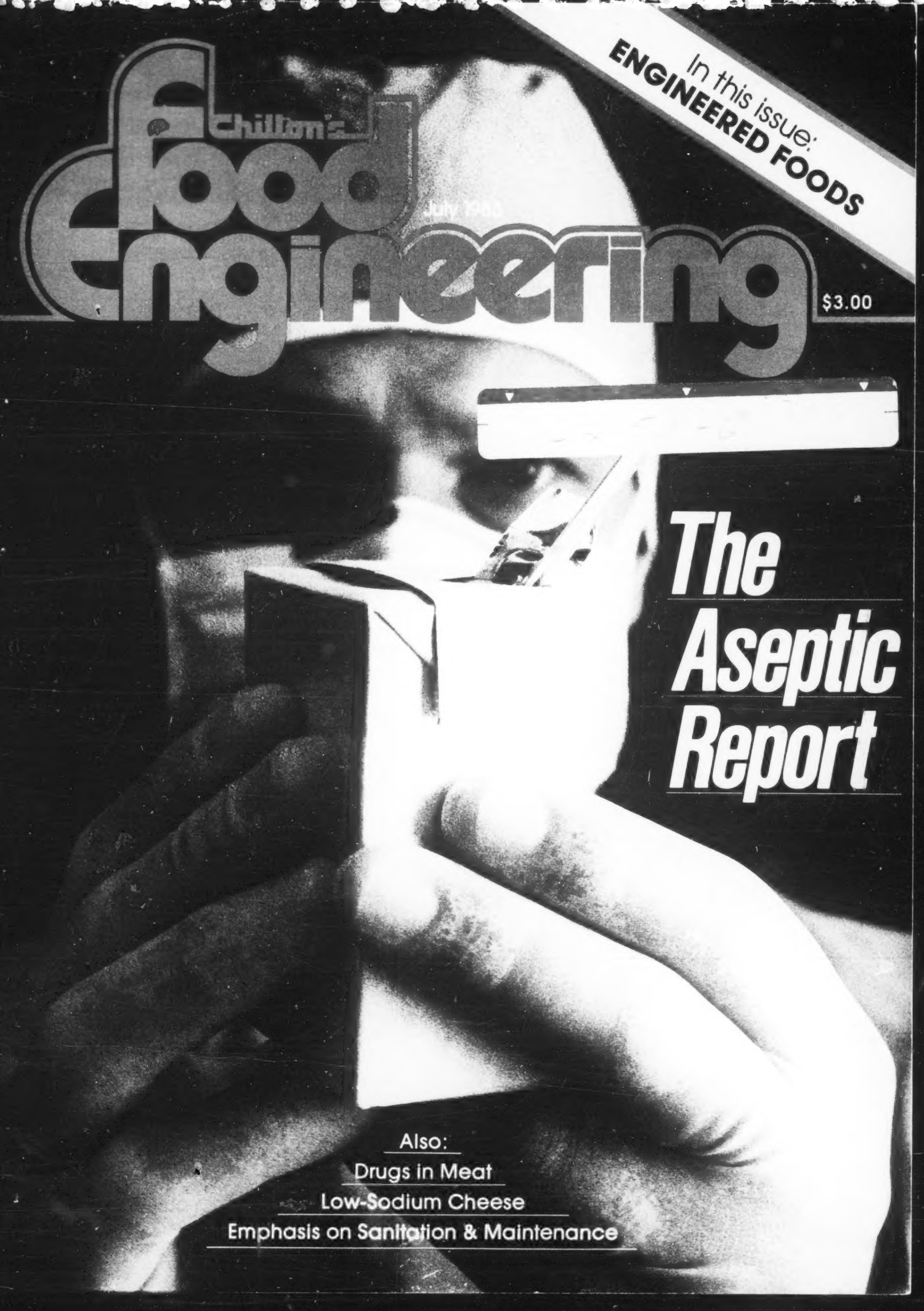

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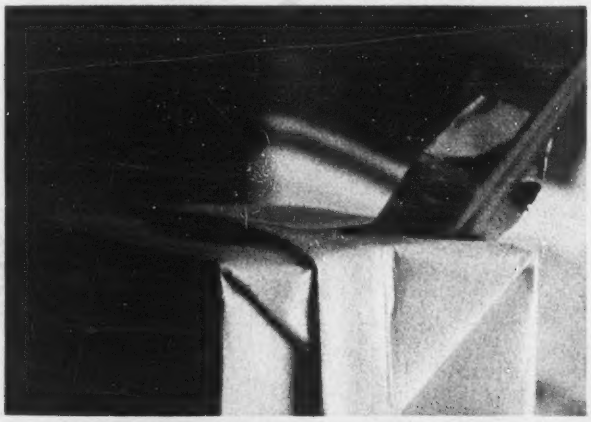

COVER STORY: Seven articles describe what's happening in the fast-moving world of aseptic packaging. Some big names, and some big money, are getting into it.
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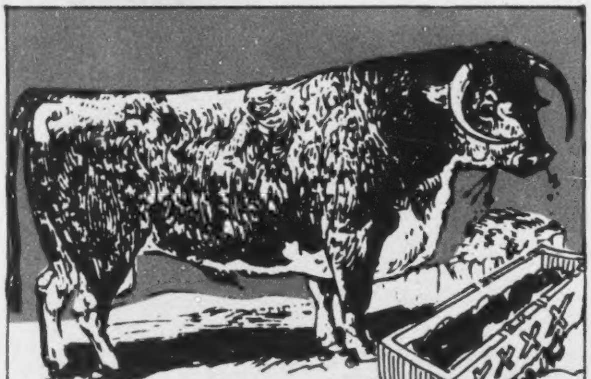

DRUGS IN MEAT: FDA is on the hot seat explaining its position on this complex safety issue.
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LOW SODIUM CHEESE: Here's a look at what industry, government, and academia are doing to reduce the sodium in cheese.

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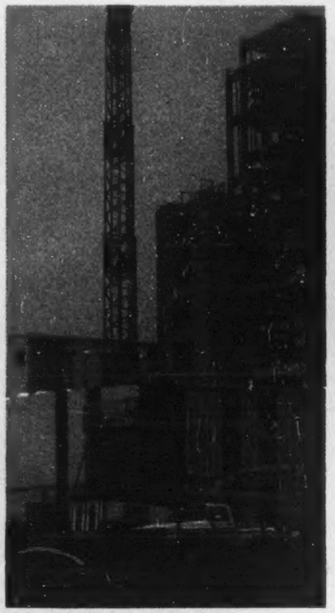

SORBITOL PLANT: What is described as "the most advanced plant of its kind" has just come on stream in Illinois.

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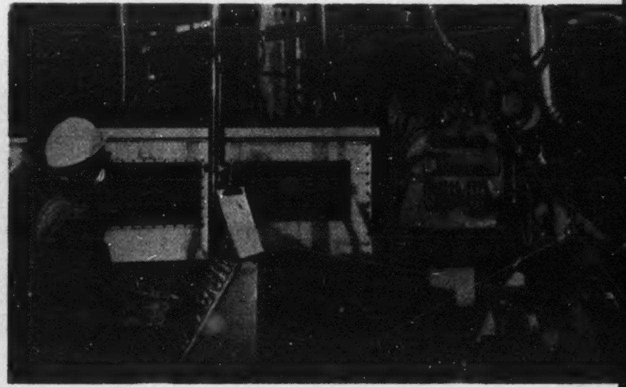

SANITATION & MAINTENANCE: This month, special emphasis is given to sanitation and maintenance. Seven articles describe how food companies are taking advantage of the latest techniques. Also included is a round-up of new equipment.

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FOOD ENGINEERING® (ISSN 0193-323X) July 1983, Vol. 55, No. 7. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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The Aseptic Report

Comparing the costs of aseptic

A study by Du Pont shows aseptic packaging systems cost 50% less than glass or steel containers.

Total system costs for packaging juice products in one-liter aseptic cartons can be half as much as packaging in steel or glass. So concludes a recent study sponsored by Du Pont Company's Flexible Packaging Division, Wilmington, Del., and conducted by an independant firm, Midwest Research Institute (MRI), Kansas City, MO.

The study compared four packaging systems: aseptic, glass, steel, and paperboard. To make the cost picture as complete as possible, both in-plant and out-of-plant costs were considered. In-plant costs were: *processing* (e.g., pasteurization), *filling* (container filling, sealing, and labeling), *casing* (case-packing, gluing, and shrink-wrapping trays), and plant *case storage.*

Five out-of-plant costs were also added in: transportation to the warehouse, product storage, transportation to the retail outlet, retail storage, and retail display costs. While transportation and storage are not direct packaging costs, they do influence final costs. Handling for example, can tie-up plant production and inventory.

To insure the accuracy of their comparisons, researchers looked at five different aseptic systems. Looking at only one aseptic system could be misleading, especially if the system happened to be less costly than others. So after compiling costs, researchers chose the most expensive system to represent aseptic packaging.

The study reported packaging with the aseptic system is roughly half as expensive as packaging with glass or steel. Results show the aseptic system costs $668 to package 1,000 gallons of juice product in one-liter packages. To pack the same amount of product in half-gallon glass containers costs about 80% more, $1,206. Quart glass containers are twice as expensive, $1,360. So are 46-ounce steel containers at $1,328.

According to the study, even if "down the line" costs were not taken into account, the aseptic method would still offer impressive savings over glass and steel. For instance, the sum of aseptic costs from processing to warehouse transportation is $648.90. The same costs for half-gallon glass containers add up to $1,123.45. Quart glass containers come to $1,258.49, and 46-ounce steel containers cost $1,254.61. A more complete cost breakdown is shown on the accompanying chart.

Aseptic filling is less

A major price differential occurs in the filling area (Researchers included a number of items in filling costs, including the cost of individual packages. See chart under filling.). Aseptic filling is by far the lowest cost method, at $402.90 per 1,000 gallons of product. Half-gallon glass is next at $753.94, followed by quart glass at $850.88, and 46-ounce steel at $993.06.

One of the biggest reasons for aseptic's good showing in the filling area is the cost of the container itself. Researchers found it costs $371 to package 1,000 gallons of product in one-liter aseptic containers. The least expensive container after aseptic is half-gallon glass at $730. Next comes quart glass at $812, followed by steel at $974.

Furthermore, shipping material costs—outer cartons, shrink wrap, etc.—were a low $88 for aseptic containers. Glass was twice as much, about $169. Steel also was higher at $118.

The study also looked into paperboard containers with very interesting results. It seems paperboard currently offers the lowest total system cost of all systems compared in the study, *including aseptic.* The cost of quart-size paperboard containers is approximately $400 to package 1,000 gallons of product. That figure is 60% of the aseptic system, and 30% of the glass and metal systems. Half-gallon size paperboard containers are slightly more expensive, but still are well below aseptic. The cost to pack 1,000 gallons of product in half-gallon paperboard containers is $484, still $184 cheaper than aseptic systems.

It would seem paperboard is the container of choice. However, researchers eliminated paperboard's cost advantage because the con-

Total System Costs

Costs for three juice-packaging systems (in dollars per l,000 gallons packed)

Operation	Aseptic 1-liter flex. carton	Glass (quart)	Glass (½-gal)	Steel (46 oz.)	Aseptic Cost is:
Processing	$ 16.81	$ 8.89	$ 5.51	$ 3.83	Highest
FILLING					
In-plant Costs	31.90	38.88	23.94	19.06	2nd Highest
Package Costs	371.00	812.00	730.00	974.00	Lowest
Total filling Costs	402.90	850.88	753.94	993.06	Lowest
Casing	93.02	192.34	180.77	121.36	Lowest
Case Handling	8.14	25.84	12.92	5.36	2nd Lowest
Plant Storage	7.15	18.04	9.93	4.87	2nd Lowest
Transport to Whse.	120.88	162.50	160.38	126.13	Lowest
Warehouse Storage	4.19	4.44	4.76	4.15	2nd Lowest
Transport to Retail	12.09	16.25	16.04	12.61	Lowest
Retail Storage	1.75	1.82	1.95	1.74	2nd Lowest
Retail Display	1.33	79.36	59.41	55.57	Lowest
TOTAL	$668.26	$1360.36	$1205.61	$1328.68	Lowest

Costs represent capital and operating expenses. Capital costs include equipment (3 yrs. @ 17%) and buildings (20-yr payout, no financing). Operating costs include leasing, labeling, individual containers, packing (shipping) materials, maintenance, labor, electricity, steam water, and transportation.

tainer needs refrigeration during handling and shipping. Aseptic, glass, and metal containers do not. Also, the study determined that if aseptic containers were refrigerated at the retail level for convenience or merchandising purposes, total system cost would increase by only $26 per 1,000 gallons.

Still, the aseptic system wasn't the most inexpensive in all operational areas. Processing costs for aseptic are two to five times higher than other methods. In addition, steel was less expensive for case handling, plant storage, warehouse storage and retail storage.

But these costs are not enough to drop the cost of glass, steel, or paperboard systems below aseptic. The study concludes with the cost advantages aseptic systems enjoy over other packaging techniques, one-liter containers could capture a major portion of the market now held by popular-size glass and metal containers.

'Expensive' 250 ml package

Most of the current aseptic container market consists of individual serving size packages (200cc and 250ml). Although this container size has no market comparability to quart glass, half-gallon glass, or 46-ounce steel containers, total system costs were included in the study.

The study found individual serving size systems cost more than their one-liter counterparts. In fact, the system cost for small aseptic containers is slightly higher than glass and steel, ranging from $1,502 to $1637 per 1,000 gallons of product. These costs are based on a "constant" individual container cost of 4.5 cent each. Refrigeration at the retail level was also considered, but not added in. Often, smaller-size containers are refrigerated at the retail level, especially in convenience stores. It was determined, however, that this would add only $47 to total system costs.

The small aseptic container sharply reflects the effect of container size on total costs, similar to the comparison between quart and half-gallon glass systems. For instance, it was found that smaller aseptic containers have higher capital costs than their larger cousins. Between 11 and 17% of total system costs are capital. The reason is lower throughput—not higher building or equipment costs. The fastest 200cc system is only 36% as fast as the slowest one-liter system.

Aseptic container construction

One of the aseptic containers examined in the study was made with layers of polyethylene, Surlyn, foil, and board. In more detail, the layers were composed of polyethylene, Surlyn, foil, polyethylene, board, print, and polyethylene.

Surlyn is an ionomer resin which provides long-term resistance to most juices, and retains its adhesion to foil. It also gives resistance to pinholing and flex cracking. Even in the thinnest gauges, Surlyn is a high-integrity adhesive layer.

Surlyn also helps prevent delamination caused by the acidic nature of some products, protecting against leakers. It also resists fats and oils, maintaining good adhesion in oily environments. One additional benefit is superior adhesion to foil and PE without priming. A layer of Surlyn and PE can be co-extrusion coated to unprimed foil. The result will be better package integrity, and long shelf life.

In conventional processing, Surlyn has FDA approval for direct contact with food and beverages. Approval is currently being sought from the FDA for food contact after hydrogen peroxide sterilization. FE

food engineering

August 1983

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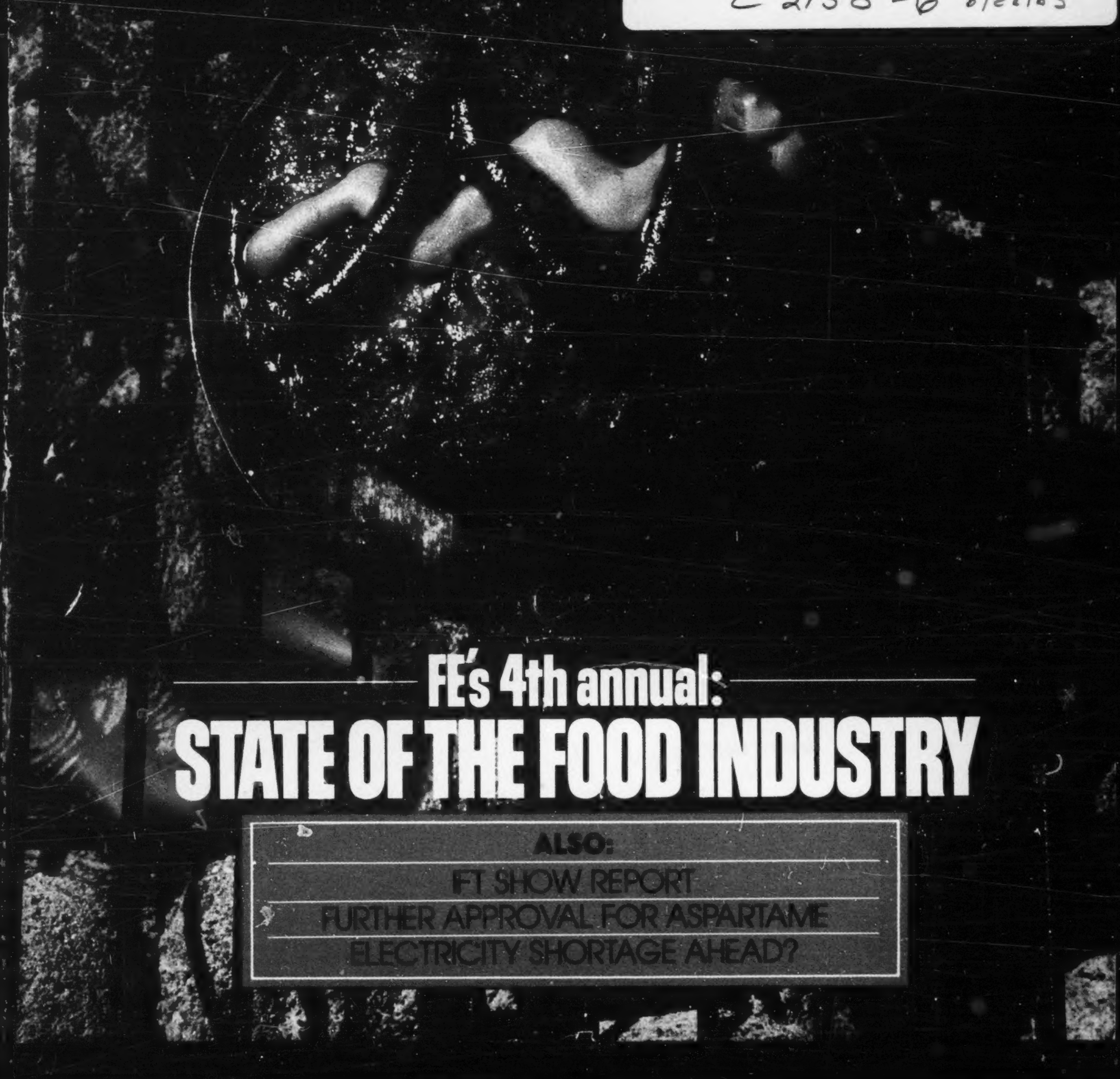

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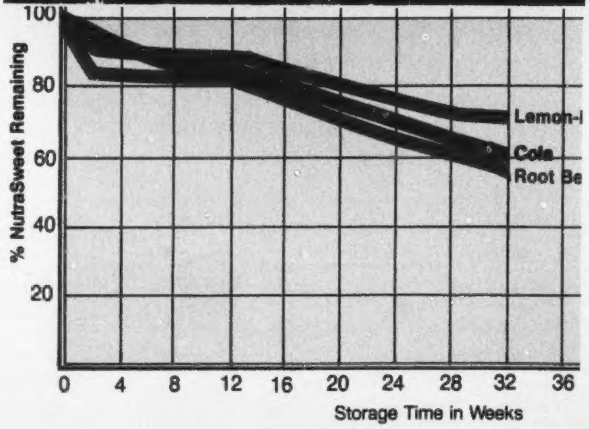

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PEPSI'S ALUMINUM BOTTLE: Pepsi is market-testing this interesting new container which combines the advantages of cans with the resealability of bottles. If successful, the new containers will be rolled-out quickly throughout the country.

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FOOD ENGINEERING® (ISSN 0193-323X) August 1983, Vol. 55, No. 8. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. Title registerd in U.S. Patent Office.

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The plastic invasion continues:

PET for Liquor

PET will begin laying claim to a significant portion of the liquor bottle industry this year, according to this report.

PET homopolymer has emerged as the leading candidate to replace glass in liquor bottles. Market tests for the 1¾ liter size bottles should begin around mid-1983. PVC was banned in 1973 by the BATF because of the detected presence of small quantities of unreacted vinyl chloride monomer which was believed to cause carcinogenic problems. Despite this setback, the distilled spirits industry, resin suppliers and plastic bottle producers have maintained a keen interest in the potential use of plastic bottles for liquor packaging.

FDA & BATF approval

PET is acceptable to the distilled spirits industry and has been approved by the FDA and by BATF for distilled liquor products not to exceed 50% alcohol by volume (100 proof). U.S. distillers consider PET bottles to have outstanding clarity, color, transparency and break resistance; no negative taste or odor factors; and acceptable product retention capability. PET is superior to glass in handleability; acceptable environmentally; and possesses favorable economic factors. The only significant limitation on the use of PET is the present inability of making hollow handleware bottles with this plastic.

In the early 70's, American Distillers, Barton Brands, Seagrams, Hiram Walker, National Distillers, James B. Beam, and Brown-Forman test marketed several sizes of PVC liquor bottles. The bottles were produced by conventional blow molding techniques yielding non-oriented bottles. These bottles were used to package brown liquors; i.e. bourbons and blended whiskies.

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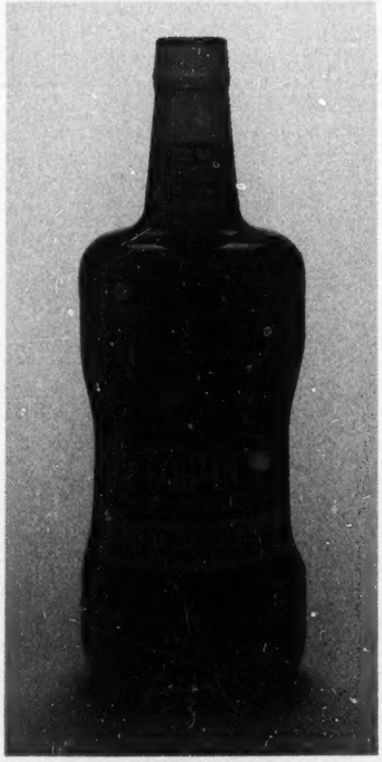
Ryder Associates, Inc.
Whippany, N.J.



PET containers have excellent clarity and barrier properties, no negative taste or odor properties and are approved by the FDA and BATF.

Recently PET, PET Copolyester, Nitriles, "Low Monomer" PVC, and Polycarbonate have been evaluated by distillers for their potential use for liquor bottles. The results show that PET and PET Copolymer are both considered generally acceptable for liquor packaging. At this point, PET homopolymer, since it has been approved by both the FDA and BATF for liquor packaging, as well as the lowest price, is considered to be the best candidate.

The distillers rated the nitriles, polycarbonate, and "low monomer" PVC as marginal or unacceptable for taste and odor. PVC and the polyesters were found to be suitable in product retention. Principle losses were water losses, resulting in a proof rise. On the other hand, polycarbonate and the nitriles allowed excessive water loss and proof rise. Alcohol permeation rates are seen to be low and comparable for PVC, the Nitriles and PET. PVC and PET had comparable water losses from bottles, while water losses from the nitrile bottles were about 1½ to 2¾ times greater.

- **Water Permeability.** PET and rigid PVC have the lowest water permeabilities (P factors) ranging from 1.8 to 4.2 Gram-Mil/100 sq. in.-day @100°F, followed by the nitriles (5 to 7.5), and then polycarbonate (14). The P factor for PET ranges from 1.8 to 4.2, depending on its level of crystallinity and orientation. At a blow molding stretch ratio of 3x, PET's P factor is about 2½, which puts it in the middle of PVC's P factor range of from 2 to 3.
- **Resin Costs.** PET at $0.60/pound is about 14% lower in resin cost than rigid PVC at $0.70/pound. The cost of the nitriles at between $0.92 - $1.08/lb. and polycarbonate at $1.69/lb. are considered to be excessive.
- **Proof Changes.** Through a confidential cooperative testing program, Ryder Associates has arrived at data and projections on weight losses, proof rises and color changes in 1¾ liter uncoated PET bottles and half-liter coated (0.45 mils Daran 820 PVDC) PET bottles. Accelerated shelf life tests were run by storing product at 110°F for 28 days before testing. The results obtained under

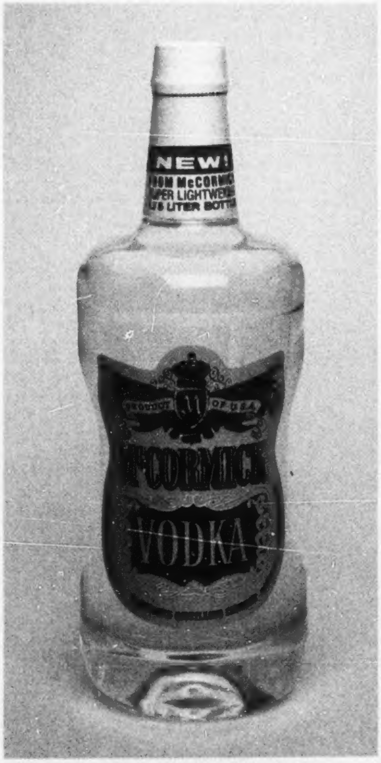
these conditions are said to be equal to a one year shelf life under normal conditions of storage and handling.

The data predicts a one year proof rise of 0.4 for the 1¾ liter PET liquor bottles. Despite having a 43% higher surface-to-volume ratio, the coated PET half-liter bottles produced a proof rise half that of the 1¾ liter bottles. The average turnaround time for bottled distilled spirits in the U.S. is about 6 months. Distillers feel that an average proof rise of ½ to 1 per year will be commercially acceptable. BATF has not issued any specifications on maximum allowable weight losses or proof rises. However, should the need arise for improved proof retention, distillers would certainly look at coated bottles as one means of improving water barrier properties of PET liquor bottles.

- **Bottle Weight Comparisons.** Compared to glass, weight savings range from 70 to 90% with PET. The 1¾ liter PET bottle at 3 oz. is roughly one-tenth the weight of its glass counterpart. After being filled with liquor, the total weight of goods packaged in PET is less than two-thirds the weight of goods packaged in glass. For 500 ml bottled goods, the weight savings in PET bottles is about 40%. For 200 ml bottled goods, the savings is about 47%. These weight savings translate into improved handling and convience for the consumer.
- **Outbound Freight Savings.** Although it is obvious that PET bottles are lighter and easier for a consumer to handle and carry, it is not obvious as to what freight savings might result from switching to plastics. An outbound freight analysis made for 50, 200, and 500 ml and for 1½ liter PET and glass liquor bottles shows that although use of the PET bottles does offer freight savings compared to glass, those savings are quite modest The savings for 50 ml bottles were about 2½ cents per 120 bottle case; about 13 cents per 48 bottle case for 200 ml bottles; about 14 cents per 24 bottle case for 500 ml bottles; and about 7½ cents per 6 bottle case for 1¾ liter bottles. In the same size truck, compared to glass, you can ship about 6% more 50 ml PET bottles, 27% more 200 ml, 28% more 500 ml, and 25% more 1¾ liter PET bottles. A similar analysis of inbound freight showed no differences in shipping costs between glass and plastics.
- **Tooling Costs and Bottle Prices.** Apparently, distillers have had to pay for both prototype tooling for bottle development, and production mold sets. Production mold sets are expensive and can cost as much as $200,000 per set to produce 1¾ liter oriented PET bottles. Because of these high start-up investment costs, distillers will probably not rush to convert to plastics in the other bottle sizes, immediately after the introduction of the 1¾ liter PET bottle.

Prototype costs

Wheaton Industries has programs underway to develop and market injection blow-molded 50 ml PET bottles (squares and rounds), as well as 200 ml flasks. Prototype mold costs range between $10,000 to $14,000, while production tooling runs between $65,000 to $75,000 for the 50 ml bottle, and $90,000 to $110,000 for the 200 ml flask, depending on the desired number of cavities. The selling prices, including reshipper carton, will range between $59 to $79 per thousand for the 50 ml bottle, and between $90 to $98 per thousand for the 200 ml flask, depending on quantities. In comparison, 50 ml glass bottles cost $79 per thousand and 200 ml glass flasks cost $130 per thousand during the first quarter of 1983.



McCormick's 1.75 liter bottle for vodka and bourbon, manufactured by Sewell Plastics, demonstrates the excellent appearance PET provides.

The top 10 distillers accounted for about 70% of the total market in terms of cases being shipped. Six of those ten, accounting for about 52% of the market in 1980, are reported to be actively interested in plastic liquor bottles, i.e. Seagrams, United Vintners (Heublin), National Distillers, Hiram Walker, Brown-Forman, and James B. Beam.

2.2 billion unit market

About 2.2 billion glass liquor bottles were shipped into the U.S. distilled spirits industry in 1981. The 1¾ liter bottle accounted for 246 million, or about 11% of the total domestic bottle shipments. About 65% of this total had handles. In the past, in the case of glass, distillers have noted a distinct consumer preference for handleware bottles in this size range. However, consumers may find that the handleability and pourability of the lightweight plastic bottle will be satisfactory, despite the lack of handles.

Distillers feel that the 50 ml and the 500 ml bottle will be next in line for conversion to plastics, assuming the successful market acceptance of the 1¾ liter PET bottle. 212 million 50 ml glass bottles and 286 million 500 ml glass bottles were shipped in 1981.

487 million 200 ml glass bottles (22% of market totals) were also shipped in 1981. Distillers have mixed feelings as to the potential for plastics in this size bottle. Some distillers feel that there might be a "size impression" problem for plastics in this size range, since the plastic bottle will be smaller in size compared to glass, and appear to hold less liquor. On the other hand, other distillers feel that the light weight, relatively unbreakable 200 ml plastic bottle will be readily accepted, if not preferred by the consumer. Despite these conflicting opinions, distillers generally agree that the 200 ml bottle will be the fourth size to convert to plastics.

Distillers presently feel that the 750 ml and 1-liter bottle sizes which accounted for 474 million units and 508 million units shipped respectively in 1981, will be the last to convert to plastics. It is said that distillers build their "images" with these sizes. . . and they won't be quick to chance the conversion to plastics. Not unless they get especially strong plastics preference signals fron consumers. This means that, at least for the foreseeable future, about 44% of market totals (almost a billion units in 1981) will not be penetrated significantly by plastics.

(Continued on next page)

PET Bottles . . .

After considering the opinions of a number of U.S. distillers, PET resin suppliers, and equipment producers, Ryder Associates has developed projections for plastics penetration, which are essentially judgement calls. In making these projections, the following assumptions were made.

1. The total market would grow at the rate of +1% per year.
2. The bottle size distribution would remain constant.
3. Consumers accept plastics
4. No significant adverse reactions from governmental agencies or environmentalists.
5. No major upheavals in the U.S. economy.
6. No significant start-up and conversion difficulties for plastics.
7. 1¾ liter PET bottles would enter the U.S. market by mid-1983 and 50 ml PET bottle by 3rd or 4th quarter 1983.

The 48 million bottles projected to be shipped in 1983 would require about 9 million pounds of plastics and would represent about 2% of the total 2.25 billion unit liquor bottle market. In 1987, plastics could account for about 560 million of the total 2.35 billion bottle market, or about 24% of market totals. The corresponding resin demand is estimated at 59 million pounds.

Second Chance for PVC?

U.S. distillers continue to have an open mind to the potential use of PVC for liquor bottles, provided:

1. They are acceptable in odor and taste.
2. Have FDA and BATF approval
3. Have acceptable proof retention and barrier properties, and are at least comparable to PET.
4. Can be formed into functional and attractive containers. . . comparable to PET.
5. Are priced competitively with glass and PET.

The big plus for PVC is its ability to be formed into hollow handleware bottles. This is still considered important for the 1¾ liter bottle and could be *the* opening wedge for PVC in the U.S. liquor bottle market.

While the door is still open to PVC in the U.S. market, its limitations will have to be overcome quickly before PET becomes irrevocably entrenched.

This article is based on a copyrighted paper given at Ryder Conference '83: "Seventh International Conference on Oriented Plastic Containers". A complete set of the papers presented is available from Ryder Associates, Inc. (5 Sharon Drive, Whippany, New Jersey, 07981) for $210 (U.S.A.), $235 (Foreign).

Market Projections: 1983 & 1987

	Millions of units			
Bottle Size	**1981**	**1983**	**1987**	
50 ml				
Total	212	216	225	
Plastics		3	112	**(50%)**
200 ml				
Total	487	497	517	
Plastics			103	**(20%)**
500 ml				
Total	286	292	303	
Plastics			136	**(45%)**
750 ml				
Total	474	484	503	
Plastics			25	**(5%)**
1-Liter				
Total	508	518	539	
Plastics			27	**(5%)**
1¾ Liter				
Total	246	251	261	
Plastics		45	157	**(60%)**
Total—All Sizes				
Glass	2,213	2,258	2,348	
Plastic		48	560	**(23.9%)**
Resin Demand Millions of lbs.		9.0	59.0	

Ryder's projections show the estimated total market for liquor bottles, with both the number and percent expected to be claimed by plastics.

Product Changes in PET Liquor Bottles

	1¾ Liter	**Coated ½-Liter***
Weight Loss, %	0.78	0.55
Proof Rise	0.4	0.2
Color Loss, (Lovibond)	0.3	0.2

**2-piece, 26½ gram generic soft drink bottle with 15 mil average side wall thickness.*

Greater protection against water losses could be provided by coated PET.

Evaluations of Major Resins

	PET	**PET Copolymer**	**Low Monomer PCV**	**Nitriles**	**Poly-carbonate**
Taste					
a. Brown Goods	A	A	UA	M	M
b. White Goods	A	A	UA	-	-
Odor	A	A	UA	M	M
Appearance: Clarity, Color, & Transparency	E	A	A	M	A
Strength	A	A	A	-	A
Ability to Produce Handleware	No	No	Yes	Yes	Yes
Product Retention					
a. Alcohol Loss	A	?	A	A	?
b. Proof Rise *(water loss)*	A	M	*sl. higher than PET*	UA	UA
Approval by:					
a. FDA	Yes	?	Yes	-	Yes
b. BATF	Yes	No	No	No	No
Resin Cost, ¢/lb *(Dec. 1982)*	60	-	70	92-108 *Excessive*	169 *Excessive*

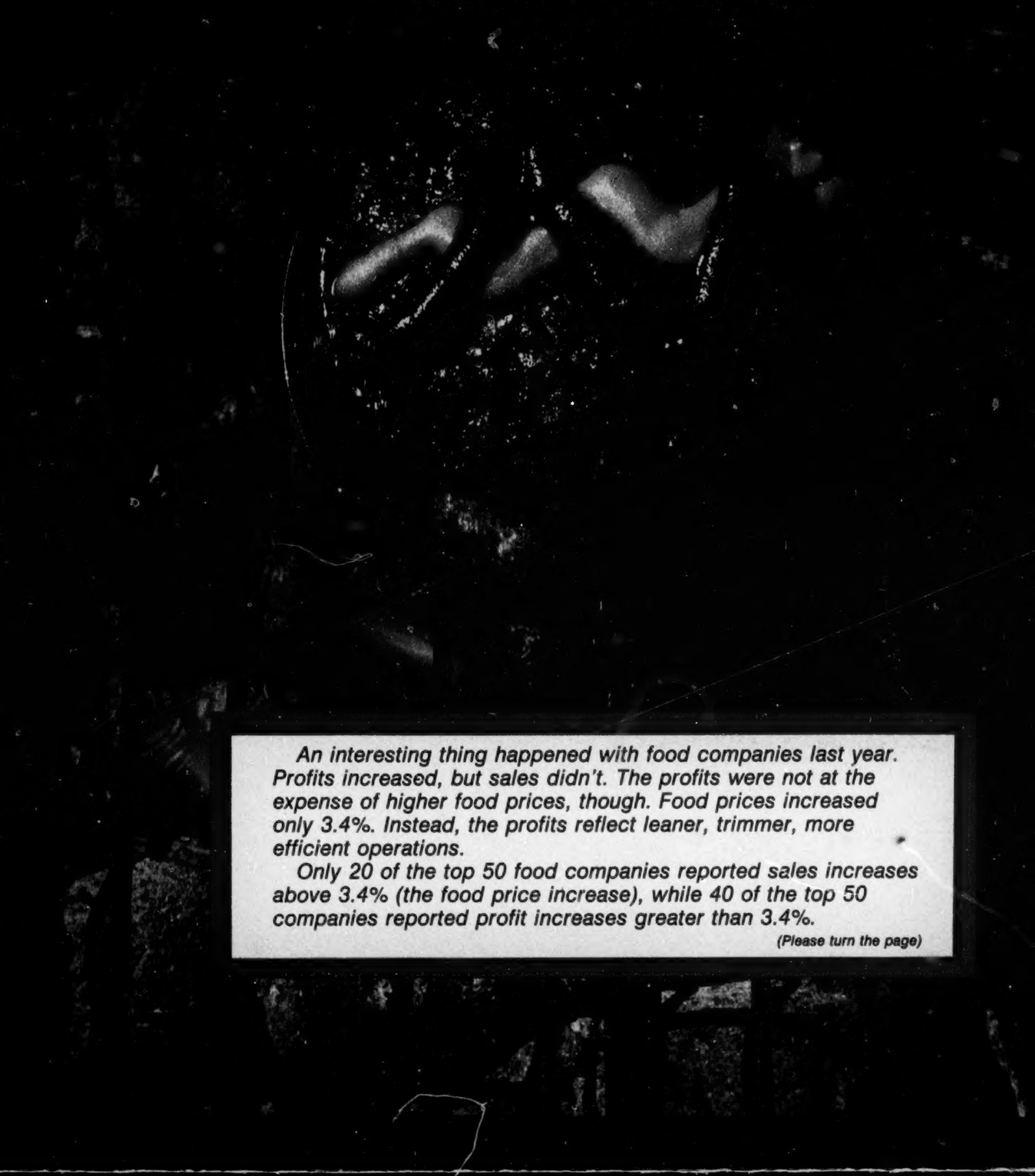
E = Excellent, A = Acceptable, UA = Unacceptable, M = Marginal

Distillers have rated the major resins for their suitability in liquor bottles.

August 1983

STATE OF THE FOOD INDUSTRY

Food Engineering's 4th annual report



An interesting thing happened with food companies last year. Profits increased, but sales didn't. The profits were not at the expense of higher food prices, though. Food prices increased only 3.4%. Instead, the profits reflect leaner, trimmer, more efficient operations.

Only 20 of the top 50 food companies reported sales increases above 3.4% (the food price increase), while 40 of the top 50 companies reported profit increases greater than 3.4%.

(Please turn the page)

State of Industry...

More than twice as many food companies reported higher profits in 1982 than in 1981. In many cases, however, the higher profits were due to internal cost-cutting measures, or acquisition of new properties, rather than increased sales.

The cost-cutting measures included personnel cutbacks and divestitures of marginal operations. But the measures also included capital expenditures to improve operating efficiences. Anheuser-Busch, for example, invested over $1 billion in new and improved facilites over the past 3 years. The company reports its production lines operated at an all-time high efficiency level of 90% in 1982. That compares to a 76% line efficiency as recently as 1979.

Star performers

The past three years have been most difficult for our nation's businesses. Yet food and beverage companies have done quite well, and several companies have done remarkably well.

In terms of increases in *both* sales and profits over the past three years, the company that leads the way is Anheuser-Busch. For each of the last three years, Busch's sales have increased 34%, 15% and 17%. Profits have jumped 32%, 26% and 19%.

General Mills and Heinz have been steady high-achievers, too, particularly with profits. At General Mills, profits increased 23%, 16%, and 16% over the past three years. Heinz recorded profit increases of 15%, 17% and 29%.

Throughout this past year, food companies were helped by favorable commodity prices. Record plantings and increased yields over the past few years have created surpluses of many crops. That, however, may be coming to an end. The intention of farmers is to reduce plantings for 1983/84 to the level of the early 1970's, according to USDA.

If that happens food company profits may dip in the year ahead. On the other hand, this could be counter-balanced by an improvement in the economy. In any event, a look at what *has* happened, and what may occur in the future is presented on the following pages in

Sales and Profit Comparisons

Company Name	1982 Sales (in Millions)	% Change 1981-82	% Change 1980-81	1982 Net Profits (in Millions)	% Change 1981-82	% Change 1980-81
Agway	1,206	3.0	196.2	15.6	-7.0	80.5
Amalgamated Sugar	320	-6.9	-1.7	16.0	-51.8	86.5
American Bakeries	527	10.3	5.9	-10.9	N.A.	12.5
American Brands	697	-9.6	6.4	31.6	-1.4	19.9
American Crystal Sugar	285	-26.0	19.0	85.5	-53.0	9.2
American Home Products	817	3.3	9.0	62.0	19.2	24.8
Amstar	1,195	-33.0	62.0	25.4	231.3	-66.8
Anderson-Clayton	1,603	-14.2	13.3	55.2	7.9	-2.6
Anheuser-Busch	4,771	34.1	15.4	284.2	32.2	26.6
Archer Daniels Midland	3,713	1.8	30.2	155.0	-11.9	51.8
Beatrice	7,285	4.7	3.1	320.8	10.7	1.5
Borden	2,891	-3.3	-1.9	117.2	22.5	21.9
Brown-Forman	885	2.9	11.9	95.2	9.7	29.0
CHB Foods	287	-5.4	7.2	3.4	-15.5	264.1
CPC Int'l	4,092	-5.8	5.4	231.6	6.2	10.6
Cagle's	190	-2.7	11.0	-3.5	N.A.	N.A.
Calif. Canners & Growers	290	-8.0	N.A.	-19.8	N.A.	N.A.
Campbell Soup	2,945	5.3	9.2	149.6	15.1	6.6
Carnation	2,836	1.1	3.5	137.6	9.9	12.9
Castle & Cooke	1,687	2.4	N.A.	8.7	-65.7	N.A.
Central Soya	1,753	-11.2	13.2	19.5	-2.5	-42.7
Chesebrough-Ponds	320	19.0	8.6	32.7	30.7	17.5
Coca-Cola	4,516	-3.6	3.6	446.6	11.1	9.8
Colgate-Palmolive	493	-25.0	0.7	21.4	-14.4	-0.8
ConAgra	1,145	22.1	55.3	21.6	28.3	120.6
Consolidated Food	3,030	5.8	4.4	142.0	-11.8	-6.4
Coors	766	-2.8	4.0	33.0	-27.5	-26.0
Curtice-Burns	484	14.6	18.0	7.2	28.4	19.5
Dart & Kraft	7,041	-3.8	3.2	198.7	9.8	-18.8
Dean Foods	747	2.5	19.1	18.4	15.0	29.7
Dinner Bell	285	4.7	7.0	1.8	-27.6	-36.4
Dr Pepper	516	39.3	9.2	12.5	-56.9	10.8
Early Calif. Ind.	201	14.1	29.4	2.2	8.0	22.4
Esmark	1,446	-2.5	10.4	28.8	-24.2	N.A.
Farmland Ind.	3,485	11.1	20.6	15.5	42.5	43.6
The Federal Co.	1,156	4.6	13.0	17.6	-12.0	99.2
Flowers Ind.	461	18.2	20.0	16.3	16.4	37.0
Formost-McKesson	1,193	0.0	6.7	31.2	6.4	14.4
Frederick & Herrud	592	27.1	-5.2	6.9	N.A.	N.A.
General Cinema	496	3.6	10.3	28.6	14.3	28.2
General Foods	7,227	−0.1	25.2	272.4	9.8	23.0
General Host	238	3.9	8.0	4.5	-34.2	27.8
General Mills	2,707	7.7	13.3	134.3	23.4	3.4
Gerber	623	4.2	12.2	39.0	7.2	18.8
Glenmore Distiller	240	10.3	-3.8	6.2	-36.5	-59.6
Greyhound	2,211	-4.0	-6.6	13.2	32.0	N.A.
G. Heileman	1,001	7.4	10.8	45.7	14.3	16.0
H.J. Heinz	3,689	3.4	22.0	192.8	15.4	17.2
Hershey Foods	1,566	7.9	9.0	94.2	-43.6	17.2
Holly Sugar	247	-24.9	58.5	-2.0	N.A.	165.8
Geo. A. Hormel	1,427	-0.5	8.5	28.1	4.1	16.7
IC Industries	1,589	5.1	2.7	26.9	10.8	20.8

Food Engineering's 4th annual "State of the Food Industry" report.

Cereals

The ready-to-eat cereal market has been described as "mature", but tonnage is growing at rates of 1 to 2% per year. And with a market of some 2 billion pounds, a 2% growth means something. In 1982, dollar sales of cereals topped $3 billion, up 8% over the previous year.

The leader in the cereal market with almost a 38% share of market is the Kellogg Co, although this market share has been eroding steadily from a peak of 43% in 1976. In an effort to halt the slide, Kellogg is banking on a variety of new products, and lower prices. During 1982, Kellogg was able to hold cereal prices at the 1981 level. In addition, it reduced the price of its flagship brand, *Kellogg's Corn Flakes* by 8% due to favorable commodity prices and the ability to produce the cereal at low cost.

Among the new products introduced by Kellogg is its *Nutri-Grain* cereals. Introduced about two years ago, the *Nutri-Grain* line has quickly captured 1.1% of the market. That may not sound like much, and Kellogg itself may have hoped for more. But when the industry's leading cereals, *Cheerios* (General Mills) and *Kellogg's Corn Flakes* each have only around a 6.5% market share, the performance of *Nutri-Grain* looks pretty good in such a short time.

Another new cereal introduced by Kellogg is *Crispix*, a crisp combination of corn and rice. The manufacturing technology used for the cereal is said to represent a new step in Kellogg technology—combining two grains in one cereal to create a unique taste and texture. Some analysts see this as a "means of getting back at Ralston Purina," which has cut into Kellogg's market share with its private-label cereals patterned after Kellogg's top-selling brands, Corn Flakes, Sugar-Frosted Flakes and Rice Krispies.

According to Advertising Age, Ralston holds about 10% of the ready-to-eat cereal market, including 5.8% for its branded cereals (mostly through its *Chex* line) and 4.2% in private label.

Sales and tonnage increase

Although Kellogg was not at all happy with slippage of its market share in 1982, almost all of the other cereal companies were satisfied

(Continued on next page)

Company Name	1982 Sales (In Millions)	% Change 1981-82	% Change 1980-81	1982 Net Profits (In Millions)	% Change 1981-82	% Change 1980-81
Idle Wild Foods	562	-4.7	-2.5	8.8	10.0	24.5
Int'l Multifoods	1,078	-2.7	5.0	33.9	15.6	11.5
IT&T	1,458	-16.2	-4.2	31.0	0.0	32.6
Interstate Bakeries	668	6.3	8.1	2.7	N.A.	N.A.
Kane Miller	761	15.3	11.1	3.9	-2.5	-12.2
Kellogg's	2,367	6.1	8.0	227.8	11.1	12.0
Knudsen	468	1.7	11.9	5.2	-25.7	4.6
Land O' Lakes	3,770	8.7	5.1	-19.2	N.A.	N.A.
Thomas J. Lipton	913	5.6	8.3	56.6	13.2	15.6
MEI Corp.	503	12.8	27.5	32.0	21.7	33.4
McCormick & Co.	718	8.8	25.1	25.0	-16.7	126.8
Mid-America Dairymen	1,275	9.0	10.7	8.5	12.6	5.9
Montfort of Colo.	996	22.0	8.6	18.9	18.1	N.A.
Nabisco Brands	5,871	0.9	4.2	314.7	18.3	13.4
National Distiller & Chemical	720	1.5	-2.5	32.5	41.3	0.7
National Grape Co-op	229	-2.7	-1.3	43.2	6.9	8.7
Nestle'	2,341	-1.9	-0.5	93.7	12.9	23.9
Norton Simon	1,232	0.1	0.3	92.5	11.0	6.9
Occidental (IBP)	5,961	103.1	152.0	57.2	20.4	53.7
Ocean Spray	355	19.8	28.3	108.3	21.1	25.9
Pabst Brewing	759	-6.5	-4.9	2.7	N.A.	N.A.
PepsiCo	5,232	5.7	17.9	174.9	-1.1	12.3
Philip Morris	3,459	5.8	12.9	157.6	38.2	-17.4
S.S. Pierce	203	37.1	13.8	2.0	38.8	15.6
Pillsbury	2,204	0.8	7.5	79.6	5.5	44.9
Procter & Gamble	2,192	0.0	-5.2	66.5	51.1	0.0
Quaker	2,067	8.7	13.8	97.3	9.0	24.6
Ralston Purina	3,962	-9.2	6.5	180.8	-49.5	12.5
Rath	435	-6.6	9.6	-6.5	N.A.	N.A.
R.J. Reynolds	3,156	35.2	10.7	51.0	2.0	11.0
Riceland Foods	695	12.2	0.9	1.3	N.A.	N.A.
Royal Crown	321	3.5	3.5	16.1	4.1	42.1
SCM	390	-7.5	-8.2	6.2	-17.0	67.2
Savannah Foods	441	-9.9	12.1	20.9	-22.6	230.5
Seagram	2,826	1.9	9.4	111.3	12.4	32.7
Smithfield	571	65.7	57.8	2.9	82.8	84.7
Smuckers	191	12.6	12.0	10.7	33.8	15.0
A.E. Staley	1,588	20.8	21.1	62.6	-40.9	43.4
Stokely-Van Camp	591	4.6	4.3	15.2	67.8	-21.0
Sun Diamond	511	1.9	17.9	52.2	5.8	4.8
Swift Independent	2,495	8.2	10.9	25.3	42.3	-10.8
Tasty Baking	185	2.9	4.6	1.7	N.A.	N.A.
Tyson	559	11.4	28.5	9.4	370.0	80.6
United Biscuits	761	8.5	N.A.	62.9	9.8	N.A.
United Brands	3,810	-2.5	7.9	2.7	-90.6	-5.4
U.S. Sugar	222	-10.6	49.2	19.3	-49.2	18.9
Universal Foods	496	13.8	15.0	18.4	31.4	28.0
Warner Lambert	648	-3.1	7.2	39.3	N.A.	N.A.
Wilson Foods	2,233	-4.0	7.4	16.7	N.A.	N.A.
Wisconsin Dairies	448	1.8	7.4	8.6	19.7	-23.2
Wm. Wrigley Jr.	581	-4.3	9.0	35.8	31.2	-7.4

Note: *All figures represent food and beverage manufacturing, only. Several companies have substantial sales in non-food items which are not included for this chart.*

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with their individual performances. General Mills' cereal products achieved record sales and increased their market share for the third consecutive year. The Big G cereal performance was paced by *Cheerios,* which recorded a 6% increase in unit volume. Its companion product, *Honey Nut Cheerios,* also did well and now ranks 10th in dollar sales among all cereals.

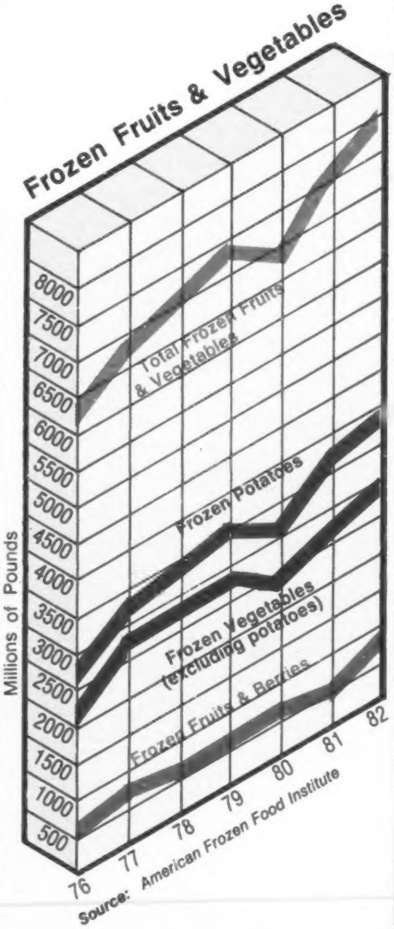
The balance of General Mills' cereals showed good strength, too. *Lucky Charms* established an all-time volume record; *Powdered Donutz* successfully moved into national distribution; *Kix* achieved its highest volume in 25 years; *Buc-Wheats* was up over 20% in unit volume; *Golden Grahams* achieved increases in volume and market; etc., etc. On the negative side, *Wheaties* held even with last year, and *Total* cereal declined slightly.

In June of this year, an interesting new cereal— *Pac-Man Cereal*—was introduced by General Mills. It is crispy, sweetened corn puffs with marshmallow bits, shaped and colored like Pac-Man and the four ghosts. This is the 23rd member of the Big G cereal family and will be backed by a multimillion dollar campaign.

The other member of the "big three" in the cereal industry, General Foods, was pleased with the performance of its breakfast cereals. The volumes of its *Post* cereals were the highest in history. This marks a dramatic turnaround from the past 3 years for GF cereals, and the company credits five new products as one of the reasons for the surge. The five products are *Fruit & Fibre* cereal; *Raisin Grape-Nuts* cereal; *Honey Nut Crunch* raisin bran; *Smurf-Berry Crunch;* and *Strawberry Honeycomb.*

Quaker Oats reports "strong volume gains" with its ready-to-eat cereals and says that many of its brands increased market share. However, Quaker's total share of the ready-to-eat cereal market is only estimated to be 8%. One interesting new product from Quaker getting an unusually fast roll-out is *Quaker Halfsies.* It is a new low-sugar cereal sweetened with aspartame and targeted for children. *Halfsies* contain half the sugar of most sugar-coated cereals, yet provides the sweet taste that many children love.

Quaker's best known products, of course, are hot cereals and the company did very well there, too. Leading the way in hot cereals was *Instant Quaker Oatmeal,* with a volume increase of 6%. The instant cereals have been quite a success story for Quaker and now represent over half its total hot cereal sales.



Source: American Frozen Food Institute

Frozen fruits and vegetables continue their upward climb. Frozen potatoes accounted for almost half of all frozen fruits and vegetables packed in 1982.

Frozen Foods

Frozen foods rebounded from their 1981 tonnage decline with a 0.9% increase in tonnage in 1982, according to SAMI statistics. As far as dollars are concerned, sales were up 10.5% from $9.619 billion to $10.625 billion.

Frozen dinners, entrees, and similar products did particularly well, erasing a 3.9% tonnage decline in 1981 with a 4.6% tonnage increase last year. Frozen breakfast foods also did quite well, particularly French toast and pancakes. And frozen pudding bars took a spectacular leap forward with a 255% increase in tonnage. Other big gainers were Chinese foods, apple juice, frozen meat items, hors d'oeuvres, and frozen prepared vegetables without sauce.

Frozen dinners hot

There's a resurgence of interest in frozen dinners, led by high quality entrees and calorie-controlled foods. Last year, the frozen dinner category recorded its first significant gain after being flat for a number of years.

One of the companies suffering in the doldrums of a depressed frozen dinner market was Campbell Soup. The volume of its *Swanson* line slipped 16% to 32 million cases, during the last 5 years. However, as it turns out, the market is still there but in a different form, according to the successes recorded by Stouffer's *Lean Cuisine* (an estimated $120 in annual sales after only one year on the national market), Armour's *Dinner Classics,* and others.

Accordingly, Campbell's introduced a new line of high-priced dinners called *Le Menu.* It includes 8 complete dinners such as breast of chicken parmigiana with fettuccine Alfredo and Italian green beans. At the same time, Campbell is at-

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tempting to build new life into its *Swanson* line, which is no small franchise. Reportedly, it accounts for about 13% of Campbell's sales. In any event, the company is said to be spending about $10 million on improved ingredients for the *Swanson* line, along with doubling its advertising to $14 million.

Meanwhile Pillsbury is revamping its *Green Giant* line of frozen entrees toward a lighter-foods positioning. Del Monte has tripled its R&D manpower for new product development for its *Morton, Chun King,* and *Patio* brands of frozen foods. ConAgra is committed to bringing out at least 3 new product concepts a year for its *Banquet* frozen foods line. Even Seagram's is getting into the act. The giant distiller introduced a line of frozen gourmet entrees under the *Feast for One* label.

Overall, frozen dinners and associated products are a $2 billion market, which grew 11% in dollars last year. The premium segment of the frozen dinner market grew 37%, according to Campbell Soup.

New frozen desserts

Frozen pudding on-a-stick chalked-up a hefty 255% increase in tonnage last year. General Foods was one big winner here as its *Pudding Pops* had first year retail sales of almost $100 million. In addition, the company has now introduced *Jell-O Gelatin Pops* frozen bars. The success shows that convenience, nutrition and fun can be a powerful combination in the marketplace.

Sensing that the frozen dessert category is ripe for growth for "health oriented products," a number of other companies are reportedly poised and ready with frozen desserts that are "good for you." Among those companies are Pillsbury, Rich Products and Beatrice Foods. A new line of frozen desserts called *Frozen Treat* from Weight Watchers (Heinz) is also seen as having outstanding potential. It gives dieters a choice of good-tasting desserts *which* are portioned and calorie controlled to meet Weight Watchers requirements. Heinz expects the new line to achieve retail sales, through dairies, in excess of $100 million in 1983.

Frozen vegetables gain

Frozen vegetables continued their forward movement last year as the total U.S. pack was over 7.5 billion pounds, according to the American Frozen Food Institute. This is about an 8% increase over 1981. The total pack for vegetables contains approximately 4.4 billion pounds of potato products and 3.1 billion pounds of other vegetables, which represents increases of 3% and 15%, respectively.

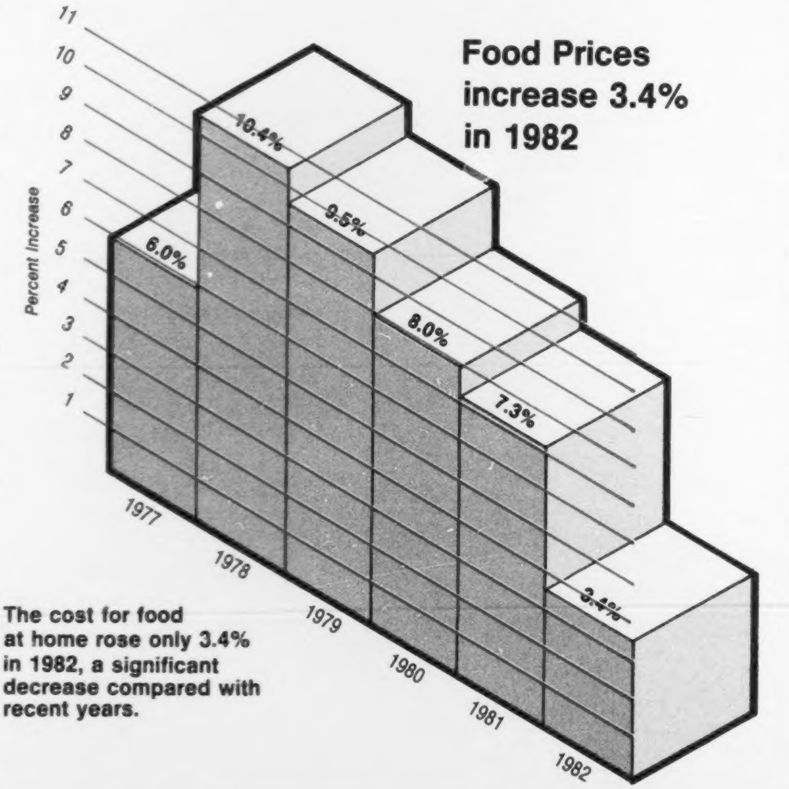
Large increases were recorded for green beans (up 34 million pounds), lima beans (up 35 million pounds), broccoli (up 29 million pounds), corn-on-the-cob (up 73 million pounds), cut corn (up 142 million pounds), onions (up 22 million pounds), and green peas (up 71 million pounds).

The major decreases were for brussels sprouts (down 9 million pounds), black-eyed peas (down 10 million pounds), pumpkin (down 13 million pounds) and squash (down 33 million pounds).

Seafood

If 1981 was hard for the seafood industry, 1982 was unyielding. Per capita consumption remained firmly entrenched at 13 pounds. Prices rose at a 3.6% rate. Landed shrimp tonnage went down 30%. Tuna processors faced price erosion and stiff competition from imports. And if that's not enough, a report showed the cultured seafood boom will not happen until the 1990's.

Still, the industry was not completely devoid of good news. Most



The cost for food at home rose only 3.4% in 1982, a significant decrease compared with recent years.

important was the end of a two-year slide in frozen seafood sales. According to SAMI, frozen tonnage sales stayed the same from September 1981 to September 1982, compared to a 7.4% decrease in 1980-1981, and a 4% decline in 1979-1980. Dollar sales of frozen seafood climbed to $769.7 million. Although sales *volume* in terms of tonnage did not increase, *prices* rose to $2.80 a pound compared to $2.66 in 1981.

Private label sales led the comeback. After decreasing 1.6% in 1979-1980, private label sales boomed 23.8% in 1980-1981, and 28.6% in 1982. In dollars, private label seafood advanced to $108,953,000.

Generics, included in the private label figures, did very well. In the period ending September 1982, generic frozen seafood tonnage sales were up 343.3%, totaling 6.5 million pounds. Further, dollar sales rose 330.9%, to $11,346,000.

Shrimp catch down

Shrimp were in short supply by late 1982. U.S.Government sources put August 31st shrimp holdings in cold storage at 40 million pounds—the lowest holdings in the past ten years. On October 31st, raw headless inventories stood at 20-million pounds, 33% below 1981. Several reasons explain the shortage, including a poor harvest in the Gulf of Mexico. Key West landings were down by 50%, while Louisiana and Texas landings fell by 30%.

King crab was, and still is, in much worse shape. In 1980-81, king crab landings totaled 187-million pounds. In 1981-82, the catch plummeted to 84.6 million pounds. With supply collapsing, prices soared. At one time, king crab meat sold at $19.00 per pound, while claws and sections sold at $8.90.

The prognosis for 1983 is not encouraging. The catch is estimated at 33-million pounds, 61% less than 1982. At best the industry hopes to stabilize the catch until supply improves. That may take four or five years, since king crab take that long to mature.

Tuna profits decline

Tuna processors faced the opposite problem—oversupply. Besides a good catch, imports rose 30%, flooding the market and deflated profits. Star-Kist, for instance, reported acceptable margins, but only with support from its canned cat food. Castle & Cooke's Bumble Bee brand went from 18% market share to 10-12%. Chicken of the Sea also dropped from 28-29% to 23-24%. Contributing to the decline was a nationwide salmon and tuna recall initiated by the FDA. At present, it looks like both brands will bounce back and improve in 1983.

The tuna industry typically sells 30-32 million cases annually. Last year, imports accounted for 4.5 million cases. The biggest advance was made by the Philippines, with nearly 1.4 million cases shipped.

Questions about aquaculture

In 1981, cultured seafood was considered a steady-growth segment of the seafood industry. For instance, a Frost and Sullivan study predicted cultured shrimp would shoot from $3 million in 1980 to $156 million in 1989. Likewise, catfish would surge to $112 million.

A recent report by Business Communications Co., Inc., downplays the growth of cultured seafood. According to the study, cultured seafood has a bright future, but not as luminous as once believed, and not until the more distant future—like 1992.

BBC reports cultured seafood was a $253.2 million industry in 1982. Growth is predicted to average 5.6% yearly, reaching $439.2 in 1992.

Good growth for catfish

According to the American Catfish Marketing Association, catfish sales reached $90 million in 1982 and will hit $140 million this year. The Association backs up its optimism with processing data summarized by the USDA Crop reporting board. In 1969, 3.2 million pounds were processed by five catfish plants. In 1982, 12 plants processed 99.4 million pounds. Farmers received $54.7 million in revenue in 1982, compared to $7.9 million in 1969.

The meat processor, Geo. A. Hormel & Co., has entered the catfish market by purchasing Farm Fresh Catfish Company, a leading company in the catfish aquaculture industry. This is Hormel's first venture into fish aquaculture. With the company's resources, cultured catfish may advance faster than any study anticipated.

Ethnic Foods

Ethnic foods are more than just pizza, tacos, and chow mein. A list of today's ethnic products would have to include crepes, ham hocks, bagels, and a variety of other foods that were considered, at least until a couple years ago, as unfamiliar and sometimes inedible. How is this explosion of foreign flavors affecting sales? The answer — dramatically.

Pasta heats up

Within the last two years, competition in the $1.2 billion pasta industry has intensified as companies like Hershey Foods, Borden, Foremost Foods, and Pillsbury fight for market shares, along with a number of privately-held companies. Subsidized imports (mostly from Italy) are creating added pressures. U.S. pasta tonnage has grown at a rate of 12.5% over the last five years.

Lower commodity prices helped keep pasta prices low for consumers, spurring demand in 1982. At the same time, the lower commodity prices made more promotional dollars available, which increased the level of competitive activity.

To keep up with the expected growth of pasta products, Borden just opened its new plant in Arizona to produce the *Creamette* line. This is Borden's third pasta plant.

Hershey (San Giorgio-Skinner Co.) obtained additional capacity in 1982 with the installation of a 4,000 pound-per-hour microwave short-cut noodle line in its Lebanon, Pa. plant. And productivity improvements were made at each of the company's pasta manufacturing locations.

Foremost opened its pasta re-

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search laboratory in Dublin, Calif. Reportedly a number of new *Mueller's* projects are high on the R&D priority list. Earlier this year, *Mueller's* entered the prepackaged pasta side dish market with *Pasta Shapes & Sauces,* a new line of pasta and sauce combinations in five flavors.

Strong market for sauces

An increased demand for pasta increases the demand for sauce. One company in particular, Campbell Soup, is riding the crest of this wave with *Prego* spaghetti sauce, which began national distribution in August, 1982. During initial sales, *Prego* quickly became the No. 2 national brand, despite being available in only 40% of the U.S. Campbell has invested more than $2 million in new production facilities for *Prego* in Camden.

The spaghetti sauce market has grown 96% in volume since 1975, and hit $600 million in 1982, according to Campbell. It is predicted to grow to $1.5 billion by 1992.

Pizza sales slow

The frozen pizza market decreased 3.6% in tonnage and 1.6% in sales in '82, according to SAMI. The softening in pizza sales was blamed on the recessionary economy's adverse effect on discretionary purchases. But the recession had little adverse effect on pizza franchise restaurants, which had one of their best years ever. Restaurant and take-out sales rose 40%.

One company competing with the pizzerias is General Mills, who introduced Chef Saluto Fresh-Bake pizza, claimed to be the only frozen product with a partially baked crust. The line is expected to replace the company's other pizzas.

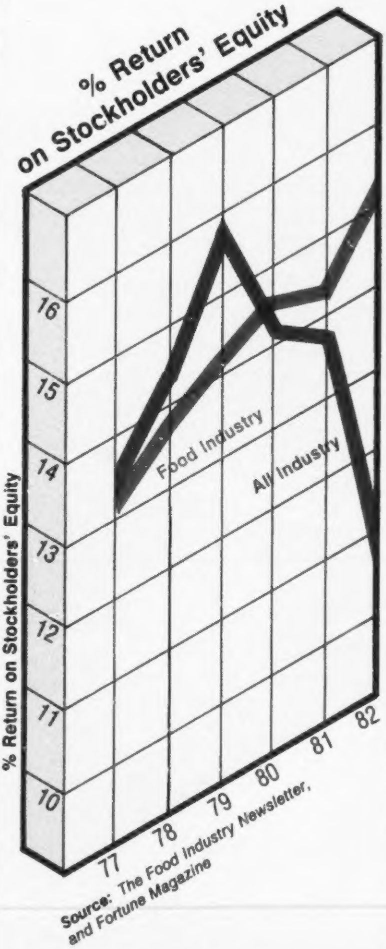
Many packers are concentrating on the foodservice market, since sales there are brisk. Several new varieties, Mexican in particular, are reportedly very popular.

Mexican foods still booming

The U.S. Hispanic (mostly Mexican) population increased more than 61% in the last 10 years. Fifteen million Hispanics were counted by the census, but that didn't include illegal aliens. This increase helps keep Mexican foods growing.

Some of the names making gains with Mexican foods are El Charrito, Dallas, Tex., with sales over $200 million. They've introduced a microwavable line of gourmet frozen Mexican products — *Classic Cuisines.*

Del Monte says burritos are one of the fastest growing Mexican items. Frozen burritos have grown nearly 50% a year since '77. Over one million cases of their *Patio* Burritos are being turned out a year. Del Monte is more than doubling their manpower for R&D new product development.



Source: The Food Industry Newsletter, and Fortune Magazine

Happiness is being in the food industry in a recession. For 1982, the median profit gain for food companies in the "Fortune 500" was +7%. The median for all industry was -27%.

Casa America Foods has a different twist for their Mexican line: they are aiming at Mexican-Americans. Their products are usually a little spicier than Mexican products made in the U.S. The company is owned by a Mexican communications corporation. Their first year sales hit $10 million.

Oriental foods grow

Oriental foods had been relatively stagnant over the past couple years, but the introduction of several oriental style entrees from Stouffer Foods is leading a comeback. Tonnage of frozen oriental foods declined in both '80 and '81, but rebounded a whopping 31.6% in '82, according to SAMI. The Stouffer products are part of the Lean Cuisine group. Oriental foods are currently in third place on the U.S. ethnic foods list, but are expected to grow as Americans search for nutritious, low-calorie foods.

What about soul food? A company in Chicago is now making products aimed at the nation's largest ethnic group. The Soul Chef line offers Afro-American foods with Southern roots.

Canning

Canned fruits and vegetables continue to lose ground to fresh and frozen, and the exodous of both large and small canners from the industry continues. Two years ago, the big name that pulled out of the business was Libby, McNeill & Libby. Nevertheless, the Libby trademark is still alive after being sold to California Canners and Growers (Cal Can) for canned fruits, and to S.S. Pierce for canned vegetables.

The latest big name to signal the end of the line, however, *is* Cal Can, the nation's second largest

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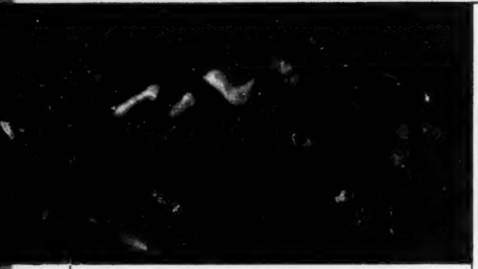

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fruit and vegetable canning cooperative. In June of 1983, Cal Can filed for protection under Chapter 11 of the Federal Bankruptcy Code.

High interest rates, high levels of debt, and low prices for canned fruits and tomatoes were responsible for the company's financial plight. Last year the co-op lost $19 million, its third straight year of red ink. Sales for Cal Can were running around $340 million a year.

Advertising may be answer

Would an extensive promotional campaign help improve the demand for canned products and help turn around the canning industry's misfortune?

The advertising agency for Del Monte thinks so. They point out that total advertising spending for canned vegetables is about $5 million per year, compared with $240 million for cereals. Yet the market for vegetables is larger. Accordingly, Del Monte's new advertising campaign will stress that canned vegetables are as nutritious as fresh. This is true when nutrient losses during cooking and preparation of fresh vegetables in the home are considered.

Another promotional effort for canned foods is being launched by Continental Can Company. The company is rolling out advertisements with the theme "good food comes in cans." The campaign points out the wide array of tasty—and convenient—meals that are possible with the variety of foods available in cans. In addition, a "canned foods cookbook" has been prepared to give consumers ideas and recipes.

Canners switch to fresh

In order to have all bases covered, some canners have added fresh fruits and vegetables to their operations. For example, Del Monte bought a fresh fruit operation about a dozen years ago and sales have multiplied 100 times since then. Earnings from the operation reportedly exceeded $47 million in 1981 on sales over $400 million.

The bulk of Del Monte's fresh fruit business is with bananas. But pineapples are increasing in importance. Last year, Del Monte's new $35 million pineapple plantation in Costa Rica successfully completed its first harvest and will ultimately supply the eastern U.S. and Europe.

Another canner with a success story in fresh products is Castle and Cooke (Dole brand). In 1982, all but one of the company's major areas of activity suffered setbacks from a year ago. The one exception was fresh vegetables. An interesting development here is that Castle and Cooke established a number of regional preparation centers to chop, shred, and dice lettuce and other vegetables under contract to institutions, most notably fast food outlets. Thus the company is able to provide value-added, portion-controlled produce to the outlets within 24 hours of handling.

The latest company to gear up for fresh produce is Campbell Soup Company. In April they formed a Fresh Foods Division.

Lite fruits

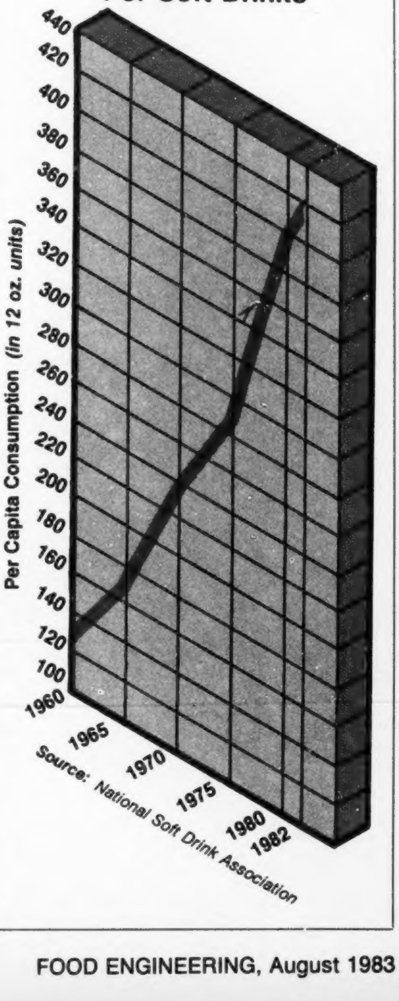
Canned lite fruits have found a place in the market and are now estimated to have about 12% of canned fruit sales. The lite fruits (canned fruits packed in extra-light syrup) were introduced about 3 years ago to capitalize on growing consumer concern over calories and sugar consumption. Generally, lite fruits have about half the sugar and one-third fewer calories than fruits packed in heavy syrup.

Del Monte's lite fruits are said to have registered a 50% volume climb over the past 12 months, and the company is now reported to have about 45% of the market for lite fruits. An all-out marketing blitz, including the distribution of close to 100 million coupons for Del Monte's lite fruits, played a key role here.

Soft Drinks

America's thirst for soft drinks continues to grow, as per capita consumption increased again in 1982. The average American now drinks the equivalent of 420 cans (12 oz) of carbonated soft drinks a year, up 2.7% from last year's average of 412 cans. In fact, per capita consumption has increased every year for the past 22 years, with the exception of 1973 when it virtually stayed the same, according to statistics compiled by the National Soft Drink Association. In terms of dollars, soft drinks sales rang up

America's Thirst For Soft Drinks



Source: National Soft Drink Association

more than $21 billion in 1982, up 5.7% from 1981.

Diet drinks score big

Almost all of the growth last year is attributed to diet drinks and no-caffeine drinks. Diet soft drinks now account for 18% of the market, a rise of 3 percentage points from last year's 15%, and that's extremely substantial. In terms of flavors of diet drinks, cola leads the way with 63% of sales, lemon-lime is next with 14%.

Diet drinks are expected to score big in 1983, too. For one thing Coca-Cola launched its massive rollout of *diet Coke.* According to Advertising Age, the introduction was quite successful from a promotional standpoint, as *diet Coke* rocketed into fourth place among all soft drinks in advertising awareness.

Meanwhile, in July, FDA cleared aspartame for use in soft drinks. Although aspartame is widely used in Canada for soft drinks (saccharin is banned in Canada), it does present some problems. According to the National Soft Drink Association, the use of aspartame in soft drinks is somewhat limited by shelf life, restricted availability, and relatively high cost.

Caffeine-free

Caffeine seems to have become a big issue in soft drinks ever since the Seven-Up Company began advertising "no caffeine" for its *7-Up* drink about a year ago. Since then, several other bottlers have followed suite, the latest being Canada Dry with its theme, "No Caffeine Since 1904."

In addition, Seven-Up Company also indroduced a caffeine-free cola, *Like.* Prior to that, the only other caffeine-free cola on the market was Royal Crown's *Decaffeinated RC.* Since then, however, Pepsi and Coca-Cola have introduced caffeine-free colas. And Dr Pepper came out with its caffeine-free product, *Pepper Free.* In retrospect, 1982 will probably be viewed as the year in which the previously minuscule no-caffeine soft drink segment exploded into a viable one.

Research by Pepsi showed that 88% of all cola consumers know cola has caffeine, and 68% of them said they would be interested in a caffeine-free cola if there were no tradeoff in taste. Pepsi feels they have accomplished that, and estimates caffeine-free colas will capture between 5% and 15% of the cola market.

Coca-Cola is also high on no-caffeine colas. One prediction from the company is that demand for decaffeinated colas will equal current levels of diet drink sales by 1985. It took low-calorie drinks 20 years to reach that level.

Meanwhile, the Seven Up Company is now beginning a slightly different attack. Its new thrust is to emphasize that *7-Up* contains no artificial colors or artificial flavors, as well as no caffeine. "Our research clearly indicates that consumers prefer food products without these artificial ingredients," says Seven Up.

New soft drink companies

Beatrice, Seagrams, and Procter & Gamble had one thing in common in 1982. They all acquired or merged with Coca-Cola bottlers.

Procter & Gamble raised a few eyebrows late in 1982 when it announced the purchase of a Coca-Cola bottler in Kentucky. The Coca-Cola Company in Atlanta initiated legal action to stop the acquisition, but eventually recanted. The bottler purchased by P&G was Coca-Cola Bottling Mideast, a privately held corporation with plants in Louisville and Lexington.

P&G entered the soft drink business several years ago by purchasing Crush International, which produces *Crush, Hires,* and *Sun-drop* brands.

P&G is not the first food giant to buy a Coca-Coca bottling operation. Beatrice Foods Co. owns the Coca-Cola Bottling Company of Los Angeles. The reason Beatrice wanted the bottling company is simple; its return on net assets is higher than Beatrice's overall corporate target of 20%. The immediate future looks extremely bright, too, as Coca-Cola is a sponsor of the 1984 Summer Olympics, to be held in Los Angeles.

Seagrams also got into the act by merging with Coca-Cola New York. Between them, they rolled-out a new line of Seagram's mixers (ginger ale, diet ginger ale, club soda, tonic and seltzer).

Bottled water

Sales continue to increase in the bottled water industry, as one out of 18 households now use bottled water for drinking and cooking, according to the International Bottled Water Association. In California, the leading state in consumption and sales, as many as one of three households have bottled water delivered to their home. Overall, sales of bottled water has increased 93% in the last five years, topped by 695.8 million gallons sold in 1982.

The leader in the bottled water market is Foremost-McKesson with 3 brands of bottled water—*Sparkletts* in southern California and Texas, *Alhambra* in northern California, and *Crystal* in Arizona.

Close behind Foremost in the bottled water market is Beatrice Foods with an estimated 15% share of market, thanks to recent acquisitions of the Arrowhead and Great Bear Springs Companies. After Foremost and Beatrice, it's a long way to third place with a number of independents battling it out.

Juice

Fruit juices appear to be shaping up as the battlefield in the food industry over the next few years. A variety of big name food processors are entering the field, enticed by aseptic packaging and consumer interest in "healthy" foods.

Which companies have been intrigued? General Mills has entered test markets with its first line of fruit juices, under the *Nature Valley Fruit-Squeeez* name. The products are described as 100% natural fruit juice blends packaged in aseptic cartons. Flavors include apple, grapefruit, pineapple, cherry, and apricot, although each is a blend of several juices. These flavors are significant in that they are rather un-

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common, and have the healthy image common to the Nature Valley brand. Both a four-carton pack and one-liter containers are being tested in Texas.

Quaker Oats also entered the competition by acquiring Ardmore Farms, a Deland, Fla. foodservice marketer of frozen juices. There are conflicting reports as to whether the company will limit themselves to the foodservice area, or enter the consumer arena.

Proctor & Gamble, who last year purchased Ben Hill Griffin, Inc., Frostproof, Fla., this year test marketed consumer products under the Citrus Hill brand. The products include three concentrates and two chilled sizes. The company predicts that the label can bring in worldwide revenue of between $300 and $500 million by 1988.

P&G promotes the products as improved over the competition because of new technology. Both concentrate and chilled versions are claimed to be less tart than other orange juices, with a more natural aroma and appearance, and a more consistent pulp level. P&G is said to be making a massive capital investment in the plant.

Consolidated Foods' Shasta unit introduced Capri Sun fruit-based drinks in '82. And Campbell Soup Company acquired a citrus juice producer, Juice Bowl Products, Inc., that is reportedly the largest single supplier to the airlines.

Pepperidge Farms, a division of Campbell's, introduced an apple juice under its own label this year, after the purchase of Costa Apple Products, Inc., in Highland, N.Y. Pepperidge Farms Apple Juice, in 32, 48, and 64 oz. bottles, was introduced in New York, New England, and Philadelphia in February, '83. The company is expected to continue to distribute under the Costa label and various private labels.

Aseptic going strong

Aseptic is coming on strong. American companies will turn out an estimated 750 million aseptic packages this year. Borden (first in the U.S. with aseptic OJ), upped their capacity several times in '82. Ocean Spray introduced their aseptically packaged products into the western U.S. Besides the 250 ml. ready-to-serve drinks, Ocean Spray is introducing liquid concentrate and a one-liter ready-to-serve package in aseptic cartons. They expect to achieve national distribution of all three packaging forms in 1984.

A major introduction into the aseptic area is the Del Monte line of 5 flavors in aseptic cartons.

OJ sales down, apple up

Even though retail sales of OJ increased by 3% to almost $2.8 billion over the previous year's record high of $2.7 billion, actual tonnage declined. The 1982 figure of 895 million single-strength equivalent gallons amounted to a 1% decline from '81. In the frozen category, dollar sales climbed 3% to almost $1.4 billion, but gave up 2% in volume, down to 485 million gallons.

Chilled OJ increased its share of market for the 12th straight year in 1982, from 37.0% to 37.6%. In 1971, when the streak began, chilled OJ had a 17.0% share. Large price increases limited sales to 290.6 million gallons in 1982.

Apple juice and cider, benefiting from growing acceptance and stable prices, has made major gains in the last few years. Increases in tonnage from '80 were 35.3%, 36.2% in '81, and 29.0% for '82. This year's increase is estimated at 20.0%.

Tonnage sales for grape juice advanced 6.5% in '81-82, production hit 372,000 tons. This is the fifth heavy crop in a row after seven straight short years. Grapefruit juice and lemon juice each had a decline in tonnage sales (4.0% and 7.0% respectively).

Brazil a contender in OJ

Waiting in the wings for orange juice shortages in the U.S. is a new grower — Brazil. In the past three years Brazil has increased production to such an extent that it is taking over some foreign markets developed by U.S. juice exporters. The Florida Citrus Mutual, a cooperative accounting for about 90% of domestic frozen concentrate production, recently requested duties on Brazilian juice exports to the US.

Not only has Brazil increased exports to third world nations, a favorite U.S. market, they've also increased exports to the U.S. In 1981, Brazil exported more than 80 million gallons of juice to the U.S., compared with about 16 million gallons five years earlier.

Snacks

Americans spent an estimated $20 billion on snack-type foods in 1982. During the last decade, the snack market has grown in excess of 11% a year, outpacing the overall rate of growth in the food industry, according to a study published by Business Trend Analysts.

One reason for the snack industry's solid sales performance is its ability to meet the rapidly changing demands of the American consumer, by developing new products and reformulating existing ones. This includes shifting product mix away from the youth market, and towards the faster-growing adult market. Examples include the introductions of Mexican style chips in the salted snack market, and innovations such as the Chipwich in the frozen "snack" area.

The industry has also been quite sensitive to the growing health and nutritional consciousness of the consumer, by creating products and developing advertising campaigns that highlight nutritional content, rather than hiding it.

Frito-Lay in the lead

Pepsico's Frito-Lay has an estimated 40% share of the $5.2 billion salted snack industry, and is believed to hold an overwhelming 75% of the corn chip market. Frito-Lay's sales have grown at about 20% per year for the past five years. Product development expenditures

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have been tripled, and capacity increased 30% in the last 3 years. In addition, the company took a major step into the $2.5 billion retail sales packaged cookie market with the introduction of *Grandma's* brand cookies (for further information about this development, see the Bakery section of this report).

Nabisco is said to be considering some new introductions to the salted snack market. A product introduced by Planters (as a Standard Brands subsidiary, Planters is now part of the Nabisco Brands family), puffed cheese balls in canisters, has been very successful. And Nabisco's is reported to be test marketing products in bags that prolong shelf life to six months (Frito's products reportedly have a shelflife of 45 days).

Another company lining up as competition for Frito-Lay is Anheuser-Busch, which is testing its line of *Eagle Snacks* salted products in bars, taverns, and airports. The line includes pretzels, potato chips, nuts, corn chips, corn curls, tortilla chips, and canned dip and tortilla chips sold as a package.

The potato chip situation has improved, since ingredient prices have moderated. Potato costs are down about 10%, and oil is almost 15% less than last year. Borden, No. 2 in the industry, has increased their potato chip production capacity 70% over the last three years by acquiring regional chip companies. And they are reportedly moving the Wise snacks to national brand status. They currently have $300 million in sales in 70% of the U.S. A couple of their recent aquisitions include Geiser's Potato Chip Co., in Milwaukee, Wis., and Seyfert Foods in Fort Wayne, Ind. The purchase of Seyfert gives Borden its first pretzel production facility.

Borden has scheduled several product introductions for '83. They include a potato chip with 33% less oil and about 20% fewer calories; a line of corn snacks with 20% fewer calories than similar products on the market, and a grain based snack line, with oats, wheat, corn and rye for ingredients.

Light, natural snacks

The new Borden lines are an example of the trend toward natural, healthy, nutritious foods. It has affected almost every segment of the food industry, and snacks are certainly no exception. About forty companies are now producing a no salt added potato chip. (Both Frito-Lay and Borden are reportedly working on their own versions.) Snyder's of Hanover ranks theirs as its third-best seller behind regular and sour-cream-and-onion with about 15% of the company's sales. Frito has also created 'light' versions of their corn-based products, and has begun a nutrition-oriented ad campaign.

Another line capitalizing on the trend is Granny Goose, which includes 100% Natural Chips, Hawaiian Style Chips, Pan Fries, and Native Style Corn Chips. Amway is getting into the act,too. They introduced *Nutri-Snax*, a high-protein nacho cheese-flavored puffed snack in late 1982. They are made from soy, rice, and corn, and contain 15% of the U.S. RDA of protein in each 1-oz. serving.

Nalley's Fine Foods has also introduced a 'light chip' targeted to health conscious consumers. Called *Golden Light*, the 3-product line is made with pure sunflower oil and 40% less salt. Superior Protein Products Co. has a snack for the nutrition conscious, too. *Lite Munchies* are extruded chips that contain 95% non-fat dry milk. They aren't cooked or fried, just formed, re-dried, and flavored. A ½-oz. package contains 60 calories.

Other indications that the natural snack area is coming on strong are these sales figures - nutmeats have grown from $600 million in 1971 to $1.2 billion in '81. They are projected to more than double again by '91. Pistachios alone were up 250%. Raisins have followed a similar pattern, from $75 million in '71 to $230 million in '81.

The American Chicle subsidiary of Warner-Lambert has introduced a line of toasted almonds, pistachios, and raisins called *Bountiful*. The product is being marketed in the Midwest. And Tenneco West is moving to expand their sales and distribution through an agreement with Nabisco Brands USA to market Sun Giant products to the food service industry.

Granola bar sales up again

Granola now represents more than $200 million in retail sales a year. Annual growth of the granola bar market ranged between 42 and 50% for the '80-82 period. General Mill's *Nature Valley* has 60% of this market, but several new products are entering the market. Hershey introduced *Trail Bars*, a mixture of a traditional granola bar and a confectionary bar, said to be doing well in test market. Quaker Oats and General Mills have both developed 'chewy' granola bars; each company reportedly has heavy ad and promotion programs for their respective products. Carnation introduced *Trail Mix* bars in '82, and M&M/Mars is said to be considering a cookie-type meal bar.

Another new product for the natural food market is General Mills *Fruit Roll-Ups* (rolled sheets of dried fruit). They have reportedly entered an expanded market following excellent acceptance in test markets. GM is also expected to test market a Betty Crocker do-it-yourself granola bar mix.

General Mills has made another change in their snack foods operation with the sale of Tom's Foods to Rowntree Mackintosh. Tom's manufactured a broad snack food line including peanuts, potato chips, baked goods, shaped snacks, and candy items sold through retail outlets and vending machines.

Popcorn: the ideal snack?

Popcorn, grew from $48 million in '71 to $153 million in '81, and is expected to reach $300 million in the next 10 years. But could we pass this figure sooner than expected? After all, popcorn is inexpensive, healthy, tasty, and nutritious. Regular and cheese-flavored popcorn has been selling well for the last two years, but candy-flavored seems to be doing even better.

Popcorn seems to be the latest craze, flavored with anything from amoretto to cinnamon to watermelon. It's even beginning to be seen in specialty stores.

Pet Food

Pet foods still make money, but the competition is a lot tougher. A steady flow of new products are fighting for a share of market, and many older brands are in trouble.

Dollar volume was up about 6% in 1982, to $4.4 billion, while production rose only 1%, to 9.5 billion pounds. And the profit, apparently, was in new products.

The U.S. pet food market should continue to grow, according to projections by Business Communications Co., Inc. (BCC), but more slowly than in the past. By 1985, says BCC, more than $4.5 billion will be spent on pet foods annually.

Cat food: Fastest growing

Cat food is one of the fastest growing of all pet food categories, reports Business Trend Analysts, Inc. (BTA), with sales of about $1.3 billion in 1982. And, throughout the 1980s, cat food sales should continue to grow 8% annually.

It is estimated that 46.7% of the $1.35 billion spent on cat food in 1985 will go for canned cat food. This is one of the strongest segments in pet foods. Both Quaker Oats and H. J. Heinz, for instance, recently credited increased profits to rising cat food sales.

Cat foods are doing well because cats are more populous than ever, and because cat owners prefer to pamper their pets. Thus, one of the newest canned cat foods to come along is Carnation's *Fancy Feast*®. The ready-to-eat, 7-item gourmet line comes in single-serving, easy-open aluminum cans. They're for cats who just can't wait for less-convenient products.

Pet Food Trends

	# of Brands 1972	# of Brands 1982	% Change	# of Items 1972	# of Items 1982	% Change	New Brand % of Market (dollar volume)
Wet Dog Food	154	105	-32%	722	834	+16%	15%
Dry Dog Food	77	154	+100	467	970	+108	30
Semi-Moist Dog Food	17	31	+82	104	142	+37	32
Dog Food Snacks	26	43	+65	115	248	+116	36
Wet Cat Food	85	64	-25	613	743	+21	11
Dry Cat Food	11	45	+209	86	250	+191	56
Semi-Moist Cat Food*	—	12	—	—	173	—	100
Total Dog & Cat Food	**370**	**454**	**+23%**	**2,107**	**3,360**	**+59%**	**31%**

SOURCE: *Table derived from SAMI data prepared for The Pet Food Institute.*
**Included in wet cat food in 1972.*

Dog food still tops

Sales of dog food during 1982 rose to about $2.7 billion, estimates BTA, up from $2.6 billion in 1981. Unit sales were about 7.5 billion pounds. Within this category, sales of dry dog food still set the pace.

More than two-thirds of 1985 pet food sales will be for dog food, reports BCC, and about $1.892 billion will be spent for dry dog food. Of every dollar spent on some type of pet food, in fact, nearly 42 cents will be for dry dog food.

But the market for dog food may be softening as both demographic and economic factors have impacted on dog ownership. Dogs require more attention than single people can give, and they eat about 152 pounds of dog food per year.

Along with changes in both human and animal life-styles, the pet food industry must contend with changing tastes. When almost all dog foods came in cans, Quaker Oats led the pack with its *Ken-L-Ration*. But the rise of dry dog foods has hurt the canned product.

Ralston leads the way

Ralston Purina chose to pioneer dry dog food—an extension of its animal feed business—at just the right time. Now, Ralston's three main brands—*Dog Chow, Puppy Chow* and *Chuck Wagon*—account for about one-third of all dry dog foods sold in the U.S.

Another change is the multitude of brands. Between 1972 and 1982, the number of dry dog food *brands* increased 100%, from 77 to 154, while "wet" (canned) dog food *brands* decreased 32%, from 154 to 105. But the number of canned dog food *products* increased 16%, from 722 to 834, and the number of dry dog food *products* soared 108%, from 467 to 970. That's a gain of 28 new brands and 615 new products.

Significantly, the new dry items have captured about 30% of their market, while the new canned food items hold only about 15% of their market. Clearly, new dry dog foods are a growing segment.

Candy

Fierce competition in the candy industry combined with moderation in sugar and cocoa prices has reversed a trend that caused candy bars to shrink almost to record low weights in 1980. A Hershey's Chocolate Bar, for example, weighed only 1.05 ounces in 1980 and cost 25 cents; today it weighs nearly 1.5 ounces and costs 30 cents, a price decrease for consumers of 60 cents a pound.

M&M Mars, D.L. Clark, Peter Paul Cadbury and other candy manufacturers have also increased the size of candy bars with little or no increase in price. The result is today the products are at their high-

(Continued on next page)

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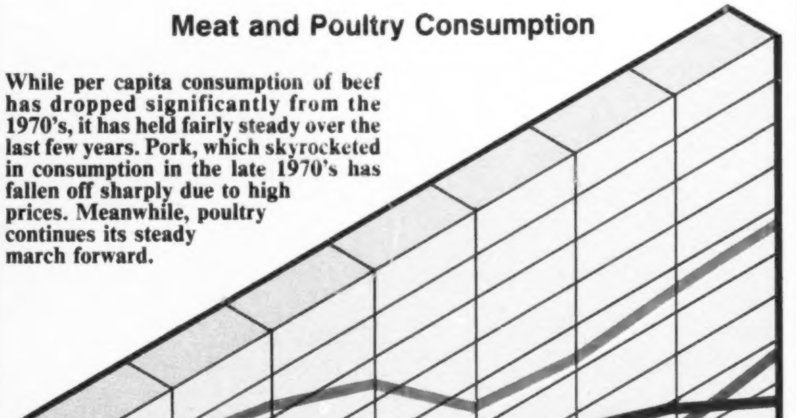
est weights in years. At the same time, profits for confectionery companies have been relatively good despite a difficult business environment.

One reason for improved profits is that ingredient costs have moderated, as mentioned above. Another reason is vigorous cost reduction programs.

Tampering dampens Halloween

Halloween, of course, is an important season for the sale of confectionery products. However, the Tylenol episode just prior to Halloween had its effect on consumers. Parents were afraid that somebody might tamper with candy given to children and the result was a significantly lower level of "trick or treating" than in past years.

As a consequence, both trade and consumer inventories of all confectionery products were higher than usual after Halloween. This, in turn, resulted in a slowdown in industry shipments from manufacturers in November. By the end of the year, however, trade inventory and order rates had returned to normal levels.



Meat and Poultry Consumption

While per capita consumption of beef has dropped significantly from the 1970's, it has held fairly steady over the last few years. Pork, which skyrocketed in consumption in the late 1970's has fallen off sharply due to high prices. Meanwhile, poultry continues its steady march forward.

Source: USDA, "Agricultural Outlook"

An alien helps Hershey

While extra-terrestrial help was not a part of Hershey's corporate plan, the company was certainly glad to accept a helping hand from that loveable alien, E.T. The fact that *Reese's Pieces* were E.T.'s favorite candy garnered a wealth of national publicity for Hershey. And this paid off handsomely in increased demand for *Reese's Pieces.*

Of course, when the movie was being made, no one could predict the success that it ultimately would enjoy. The result was the biggest and most sucessful brand promotion in Hershey history. Reportedly, around-the-clock operations were necessary at Hershey to meet the demand for *Reese's Pieces* in the last half of the year. As good fortune would have it, the company's new plant in Stuarts Draft, Virginia came on stream in October and *Reese's Pieces* was one of the principal products for which the plant was built.

Meat

Consumption of red meat products was down again in 1982, but this time it was due entirely to a sharp decline in pork. Beef consumption was virutally unchanged for the second year in a row, which can be considered good news of sorts because prior to 1981 beef consumption was spiraling downward. It nosedived from 94.5 pounds per capita in 1976 to 76.5 pounds in 1980.

Production of cattle and calves is on the rise, as 1982 marked the third straight year of increases. However, the estimated 115,691 head for 1982 is still well below the record 132 million head in 1975.

Retail prices for beef rose only 1.4% last year. The increase in meat prices has been only one-third the rate of inflation since 1979, reports the American Meat Institute.

Problems with pork

Per capita consumption of pork

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dropped for the second year in a row. For a while in the late 1970's, as pork consumption skyrocketed from 50 pounds per capita to 68 pounds, it looked as though pork would surpass beef. But since 1980, pork consumption has dropped back to 59 pounds per capita.

The current problem with pork is price. Throughout 1982 hog prices soared to record high levels and consumers switched to other foods.

Hog prices were high last year because fewer hogs were available for slaughter. In 1982, the hog population was 58,691,000. That compares with 67,353,000 in 1980. USDA reports pork production may be off again in 1983, this time by about 5%. Retail pork prices are expected to rise 4-7%.

Upheaval in meatpacking

Considerable shake-out has taken place in the meat industry over the past several years. Bankruptcies, strikes, acquisitions and spinoffs have been fairly common. The latest development is Greyhound's sale of Armour's meat-processing and packing business. ConAgra bought it for $166 million and will get 19 processing plants, one beef slaughterhouse and one pork slaughterhouse, along with all Armour trademarks.

Armour's sales in 1982 were $2.21 billion and accounted for about 44% of Greyhound's 1982 revenue. Interestingly, Armour's operations have always been profitable. But its labor costs are so high that the company says it hasn't been able to remain competitive with others in the industry.

That problem, of course, is not unique to Armour. Most other meatpackers have the same problem—and more. In April, Wilson Foods Corp. filed for reorganization under Chapter 11 of the bankruptcy code. The company had a loss of $2.6 million on sales of $1.2 billion for the first 6 months of fiscal 1983. That's not too bad these days. But the downward trend was accelerating dramatically, with an estimated loss of over $17 million for the third quarter. The big problem at Wilson is said to be the high cost of labor.

One company bucking the trend, however, is Iowa Beef Processors, now owned by Occidental Petroleum Corp. Iowa Beef brought to the industry new technology, cheaper labor and better plant locations away from Chicago and Kansas City. The result has been a rapid rise to the top with revenues and profits about double that of its nearest competitor, Swift.

Poultry moves past pork

Poultry lived high off the hog prices last year and consumption of poultry continued its long-term upward trend. In fact, poultry consumption per person exceeded pork last year for the first time ever. With further expansion in the broiler industry this year, poultry use is expected to again exceed pork use again, and even widen the gap.

This shift is a consequence of the low price of poultry relative to pork, mainly reflecting the better feed conversion ratio of poultry. Also, poultry producers can react faster to changing market conditions than hog producers can, thereby giving them a competitive cost advantage in the short run.

The primary factor in achieving efficient poultry production has been vertical integration. Poultry processors now control almost every phase of the business from hatching baby chicks that contract farmers raise, to milling and mixing the feed. They also slaughter and cut-up the full-grown broilers, package and delvier chicken parts, cutlets and whole birds to supermarkets, and process deboned meat to make chicken hot dogs, bologna, salami, patties, and nuggets.

The poultry industry's greatest asset, however, is the ability to convert feed into protein. It takes four times more grain to make a pound of beef than chicken.

Wines & Spirits

Despite optimistic forecasts and high growth rates in the past, 1982 proved to be a disappointment for the wine and spirits industries. Sales of American-made wines were "flat" during the year, according to the National Wine Distributors Association. Only an impressive showing by imported wines enabled total volume to register close to a 3% gain by year's end.

As far as all other alcoholic beverages (exlcluding beer and wine) were concerned, total shipments were down about 7%. This follows six years in which shipments grew by an average of one-half of one percent a year. The reasons for the drop vary according to different analysts, but almost everyone agrees the recession was the major cause.

Problems

Price wars broke out and advertising budgets went up as winemakers fought for a larger share of a tighter market. Seagram cut the price of its Paul Masson to keep pace with competitors, and prices of other wines have been cut by up to half since late 1981.

The most significant factor reflecting today's wine industry: The strength of the U.S. dollar. According to Business Trends Analysts' report, "The U.S. Wine Market," imported wine is going to adversely affect domestic wine producers. By 1992, import volume should reach 300-million gallons, almost 30% of the U.S. market. A 9.2% projected annual growth rate for imported wines over the next 10 years will outpace overall industry growth.

Marketing Moves

Activity in the wine/spirits segment has not, however, been dull:

- Joseph E. Seagram USA stepped into high gear with marketing its Paul Masson wines, including overseas marketing. Masson leads all California wines in Europe, even though the actual market for California wines in Europe is small.

- RJR acquired Heublein for $1.38-billion. The transaction will nearly double RJR's annual food and beverage sales, which will amount to more than $4-billion.
- In 1982, a new subsidiary, Anheuser-Busch Wines, was formed by Anheuser-Busch Co. to "probe the growing on-premise sector of the wine industry."

Prospects for the wine and spirits industry in the future are mixed. Major gains in consumption are unlikely, and competition among product rivals for a larger share of the market is expected to continue to intensify.

Beer

In 1982, for the first time in 25 years, the beer industry failed to grow. Volume was essentially flat, hovering around 181 million barrels. Only 2 of the major brewers—Anheuser-Busch and Heileman—reported increases in volume.

Heileman topped the one billion dollar mark in sales for the first time, completing a meteoric rise over the past decade, and they have done it without a national brand. The company's strategy has been to acquire regional brands and build on their strength. The exception to this, however, is Heileman's latest and largest acquisition—Pabst Brewing Company. The arrangements to acquire Pabst were finalized late in 1982, thus Pabst's sales ($758.6 million) are not included in Heileman's 1982 totals.

Busch increases its lead

The big story in 1982 was the performance of Anheuser-Busch. Volume increased 8.5% last year to 59.1 million barrels. Gross sales from brewing operations jumped 15.2% to $4.7 billion. Based on that performance, Busch increased its lead over Miller by 19.8 million barrels, and now has garnered a market share of 31.9%.

(Continued on next page)

Foodservice sales hit $133.2 billion

In spite of the recession, real sales (adjusted for inflation) for the foodservice industry rose 1.2 percent in 1982, compared with 0.4 percent in 1981. And, real sales are expected to rise another 2.0 percent in 1983. Part of the reason for optimism is that costs have remained relatively stable, allowing for price stability in menu items. And, labor costs, interest rates and even gasoline prices look as though they will remain stable in the coming months.

Foodservice sales hit $133.2 billion in 1982, according to the National Restaurant Association (NRA). This has maintained major food makers' interest in the restaurant field. At General Mills, the restaurant group is expected to grow 20% over the next five years, led by Red Lobster Inns expansion by 30 to 35 units per year. Pillsbury is putting $80 million in capital investment into its Bennigan's chain, expanding to 156 units by the end of next year. Ralston Purina's Jack in the Box chain plans to introduce a line of complete carry-out dinner meals. General Foods, on the other hand, is getting out of the restaurant business, because it doesn't fit in with overall corporate objectives.

More $ spent on fast food

Continuing demographic changes favor the trend toward increased expenditures for food away from home, according to the Food Institute. Recent Bureau of Labor Statistics findings show the percentage of the food dollar spent eating out rose over the past decade from 28.1% of total food expenditures, to 32.4% among urban U.S. households surveyed. Increased numbers of working wives, a higher proportion of single-person households are among many factors leading to stronger performance of the foodservice segment of the food industry.

While hamburgers still hold the lion's share of the fast-food market, that position is slipping. Industry-wide, orders for hamburgers have declined more than 10% over the last 3 years. In an attempt to remedy this developmment, the large chains are diversifying their menus. Various forms of chicken, salads, and ham and cheese sandwiches have appeared at different chains.

However, there is danger in too much menu expansion. Large numbers of customers have to be moved quickly in order to achieve a proper return on assets. The hamburger chains achieved this by moving one item. Other fast food chains, such as pizza, Mexican and chicken are expected to increase their market share in the near future.

Predictions for '83

According to the NRA, 1983 will see foodservice operators placing greater emphasis on improving sales during non-peak times. More restaurants will be combined with bookstores, bakeries, wine shops and delis, as the dual retail concept becomes more popular. Menus will continue to expand giving patrons the option of trading down rather than changing restaurants.

The NRA estimates that foodservice sales will hit $143.6 billion in 1983, an increase of 7.8% over 1982. In constant dollars, this represents a real increase of 2.0%, in comparison with 0.3% last year. The NRA bases this on predictions that personal income will rise 8.4% and real disposable income will advance 3%. The 10% tax cut that took effect July 1, and a moderate level of inflation should also contribute to the gain in real disposable income.

Backing up this prediction, customer traffic at the nation's restaurants increased 2.4 percent in the winter quarter of 1983, continuing the upward trend begun in the fall quarter. Sales rose 7.0 percent during the winter quarter over the same period one year earlier.

State of Industry...

For a while in the 1970's, it appeared as though Miller was going to give Busch a run for the money. They still may, though over the last two years, the pendulum appears to have swung the other way. In 1982, Miller's volume declined by 2.5%, the first decline for the company in ten years. Operating revenues, however, were up 3.2%.

In addition to widening the gap between itself and the rest of the field, Anheuser-Busch is laying the foundation for future growth, as well. In 1982, a major expansion of its Los Angeles brewery was completed, which nearly tripled the capacity of the facility to 11 million barrels. And a "mini-expansion" was completed in the Baldwinsville, NY facility which increased its capacity by about 17%. Capital expenditures in 1982 for brewing operations at Anheuser-Busch totaled $355.8 million.

On the drawing boards is a major expansion of AB's Houston brewery, which will double capacity. In addition, Ft. Collins, Colorado was selected as the location for a possible future brewery. A 1,133-acre site north of the city has been "optioned."

Light beers

The long-awaited national rollout of *Budweiser Light* beer took place in 1982 as Anheuser-Busch tries once again to cut into the huge market share (60%) of *Miller Lite*. Previously, Anheuser-Busch introduced *Natural Light*, but it never achieved its own identity, and *Michelob Light's* higher price kept it from mass popularity. Now the company is banking on the *Budweiser* name and hoping that consumers will ask for *Bud Light*.

Riding the crest of a $35 million advertising campaign, *Bud Light* indeed was off to a fast start. By the end of 1982 it reportedly had accounted for an estimated 3 million barrels, more than *Natural Light* (2 million barrels) and *Michelob Light* (2.6 million barrels). Some experts are predicting a doubling of sales for the new entry this year. But the feeling is that *Bud Light* will not hurt Miller as much as it will the other entrants in the light beer derby—Coors, Schlitz and Stroh. Heileman, incidentally, has 13 different brands of light beer most of which are "local favorites."

Imported beers

One segment of the brewing industry that continues to grow, is imported beers. Volume for 1982 was 5.7 million barrels, up 10% from the previous year. This represents about 3% of the beer market, by volume. However, since imported beers carry a higher price tag than domestic beers, the imports account for 5% of the beer market in dollar sales.

While imports are starting to make a dent in the U.S. market, Anheuser-Busch is looking to export its beers. Although Busch's efforts to crack the European market have generally failed over the past several years, the company appears to be on its way to success in Japan. For example, after introducing its beer in Japan two years ago, sales have grown from nothing to an estimated one million cases a year. Also, an estimated one million cases were sold in Guam during 1982.

Another promising market in which Anheuser-Busch has a foothold is Canada. In fact, *Budweiser*, is brewed in Canada by Labatt Brewing Co. and it is one of the top 10 brands in Canada, holding more than a 5% national share.

Miller Brewing Company is also interested in Canada. In March of this year, Miller announced a licensing agreement under which Carling O'Keefe Breweries of Canada will brew and market the *Miller High Life* brand. So the battle between Anheuser-Busch and Miller will be waged north of the border, as well as in the States.

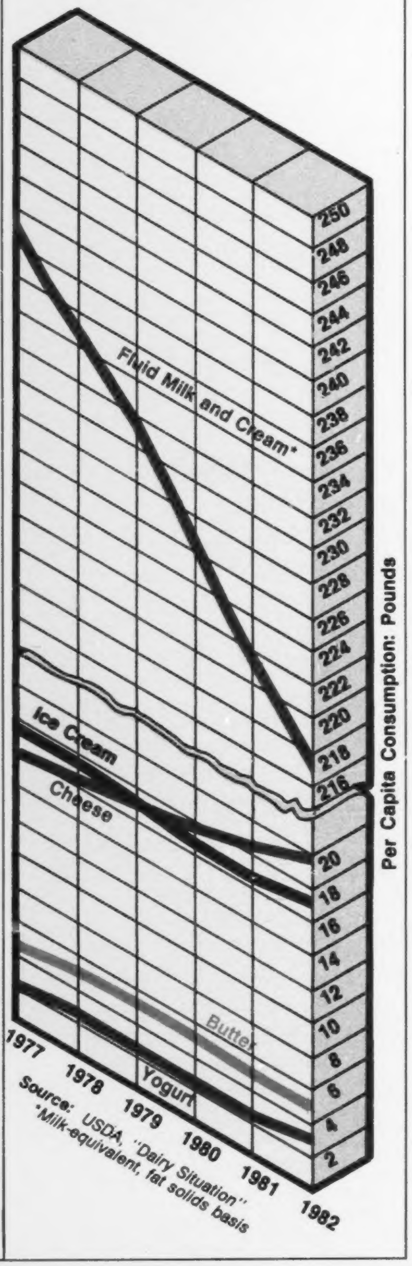
Meanwhile, Labatt Brewing Co. of Canada is invading the U.S. with *Labatt's Light*, the first Canadian light beer to enter this country.

Dairy

Total consumption of all dairy products was up last year, reversing a long-term decline. Cheese, ice cream, butter and yogurt were

(Continued on page 88)

Dairy Products: Per capita consumption



Source: USDA, "Dairy Situation"
*Milk-equivalent, fat solids basis

State of Industry...

among the products recording increases in per capita consumption.

The future for those products looks fairly good, too. According to a study by Frost & Sullivan, the market for processed dairy items will build from $8.3 billion in 1981, to $12 billion by 1990. However, during the same period, sales of fluid milk products are seen slipping steadily from $8.16 billion to $7.87 billion.

Good growth for cheese

Total cheese production in 1982 increased 6% to 4,539,822,000 pounds, according to the National Cheese Institute. Cheese imports also increased in 1982, up 9% over 1981 to 269,343,000 pounds. On the other hand, the number of cheese factories in the U.S. declined from 713 in 1981 to 697 in 1982.

Cheese is expected to continue its strong growth in the future with sales predicted to climb 53% from $6.19 billion in 1981 to $9.48 billion in 1990, according to Frost & Sullivan. Sales of cheddar and American type cheeses, the two most important categories, are seen increasing about 2½ fold in the decade. Blue mold and hard Italian cheeses are the only categories on the downside due to relatively high price and a consumer trend toward blander tasting foods.

Butter vs. Margarine

Total consumption of butter and margarine has remained relatively stable over the past five years, with per capita consumption holding around 11.2 pounds for margarine, and 4.5 pounds for butter. Yet it is interesting to note that there are far more plants producing butter (231 plants) than margarine (53 plants).

Over the last few years, butter manufacturers have introduced blends of butter/margarine in an effort to narrow the price gap and still have outstanding butter flavor.

On the other hand, margarine manufacturers are adding butter to margarine to obtain buttery taste. Central Soya with its *Mrs. Filberts* "I can't believe it's not butter" product is one example. New product activity in these areas, as well as with light spreads are expected to increase greatly in the future, according to a study by Packaged Facts.

The yogurt war

What began as simple curdled milk has now been flavored, liquefied, solidified, frozen, turned into custard and given a variety of French or pseudo-French names. And for good reason. Many people see a big market for yogurt in the U.S. Of course, that big market has been seen and talked about for at least 20 years. And while yogurt has never lived up to its potential, it hasn't died neither. Almost every year for the past 20 years, per capita consumption of yogurt has increased in the U.S. from 0.25 pounds in 1962 to 3.02 pounds in 1982.

The big news in yogurt over the past year was Kellogg's introduction of *Whitney's* yogurt which is touted as the highest quality yogurt available.

General Mills also made headlines with yogurt over the past year by introducing Yoplait Breakfast Yogurt. According to *Advertising Age,* this is the first yogurt to segment the category into specific eating occasions.

Ice Cream: Enter Pillsbury

Although the ice cream market is stable and has been growing only in response to increases in population, there are special niches that offer much faster growth. And Pillsbury belives it has found such a niche with its purchase of Haagen-Dazs, a family owned ice cream chain consisting of 244 stores.

Haagen-Dazs specializes in super-premium ice cream (single dip cones sell for $1 and up) and business has been booming.

Nevertheless, the big market for ice cream continues to be in supermarkets which account for nearly 75% of sales. And the big flavor is vanilla which accounts for about 45% of all sales by flavor.

Milk down, again

Although dairy farmers continue to increase the production of milk, sales are not keeping up, resulting in a surplus of milk in the nation. Milk production totaled 135.8 billion pounds in 1982, up about 2% from the previous year. Consumption of fluid milk was down about 2%.

From 1982 production, the milk equivalent of 14.3 billion pounds was bought by the U.S. government. In an effort to reduce government stocks, a special distribution program for needy persons was instituted. During the year, approximately 47 million pounds of butter, 180 million pounds of cheese and 11 million pounds of nonfat dry milk was distributed.

On the bright side, milk-industry advertising programs appear to be making a dent in public opinion and the long downward spiral of milk sales may finally be halted. This has been the case in several localized markets.

In addition, the milk industry is anxiously watching Dairymen's introduction of aseptic, non-refrigerated milk. In particular, the flavored milks (strawberry, chocolate, banana, vanilla, and fruit punch) could be a real winner. They are packaged in single-serving cartons identical to the packages now proving so popular for fruit drinks.

Coffee & tea

After more twenty years of steady decline in per capita consumption of coffee, the market seems to be leveling off at about 26 pounds per person, according to a report by Business Trend Analysists. In fact, the report says the future for coffee looks better today than at any time during the past two decades, thanks to the success of decaffeinated coffees, the general aging of the post World War II baby boom, and the convenience factors associated with automatic drip coffee makers.

The report predicts that coffee consumption will continue to improve, although slowly, throughout the coming decade, both in aggregate and per capita figures. Sales in pounds are expected to grow at a compounded annual growth rate of 0.7% through 1992, reaching 2,292.4 million pounds by that year.

For 1982, the coffee market was estimated at $4.2 billion with about $2.7 billion for ground coffee and $1.5 billion for instant coffee. General Foods is the dominant company in both markets.

Specialty coffees

Specialty coffee sales account for less than one percent of the total U.S. coffee market. But this market share could hit the 3 to 5 percent mark before the end of the decade, according to a report published in World Coffee & Tea magazine.

One subcategory of specialty coffees is flavored coffee, which seems to be increasing in popularity. Most of those drinking flavored specialty coffees have come from the ranks of those who never before drank coffee.

P&G enters tea market

While the market for tea held fairly steady in 1982, the interesting news was that Procter & Gamble entered the market via the purchase of Tender Leaf Tea from Nabisco Brands. This represents a new competitive element in the marketplace for tea and some experts think it will be good for the tea industry as a whole.

Presently, Lipton and Nestle dominate the national market, while Salada and White Rose have good regional strength. Those are all formidable competitors which could be spurred to new heights by Procter & Gamble, which already has a sales force and distribution system in place for *Folgers* coffee.

Lipton also has been in the headlines recently with its market test of decaffeinated tea, the first such product to be offered by a major tea company.

Bakery

Bakers had a relatively good year in 1982, thanks to favorable ingredient prices, especially sugar, eggs and shortening. Flour costs were down slightly, but since flour costs amount to more than 60% of the ingredient costs for bakers, the small drop in price added-up.

Overall, manufacturers of bread, rolls and related products saw expenses rise about 3.2%, while pretax profits rose 11%, according to a survey by the American Bakers Association. Value of shipments, estimated by the Commerce Department, rose 6.5% and hit $13.3 billion.

Food giants buy bakers

The big news in 1982 was the sale of two large, well-known bakers—Campbell Taggart and Entenmann's. The two transactions happened with two months of each other.

In August of '82, Anheuser-Busch and Campbell Taggart agreed to merge and Campbell Taggart became a wholly-owned subsidiary of Anheuser-Busch.

Campbell Taggart is the second largest commercial baker (ITT Continental Baking is the largest) in the U.S., with 58 wholesale bakeries serving local markets mostly in the Sunbelt and Midwest.

The other major purchase occurred in October when General Foods announced it was buying Entenmann's Inc. from the Warner-Lambert Company for $315 million in cash. Under Warner-Lambert, Entenmann's was essentially a regional baker with distribution in about 35% of the country. General Foods wants that to increase to 60%.

Cookie Monster in Kansas City

The $2.5 billion-a-year retail packaged cookie market is under seige by two newcomers to the market—Frito Lay (Pepsico) and Procter & Gamble. The initial battleground is Kansas City.

About a year ago, Frito-Lay introduced *Grandma's* soft, moist cookies in 16 varieties from sandwich creams to fruit-filled oatmeal, in Kansas City. Reportedly, the cookies captured about 15% of the market. Shortly after that, about 6 months ago, Procter & Gamble invaded Kansas City with its test for *Duncan Hines* cookies. The initial results are said to be "overwhelming," moreso than anyone anticipated.

Frito-Lay has now expanded its line into about 20% of the U.S. and is planning to expand rapidly beyond that. Procter & Gamble is still continuing its Kansas City test while undoubtedly preparing for a nationwide assault.

What about Nabisco?

Frito-Lay and Procter & Gamble are formidable rivals, to be sure. But Nabisco is not about to let its 40% share of the cookie market erode without a fight. The market for cookies and crackers in the U.S. rests on a substantial foundation of consumer demand, approximating 3 billion pounds a year. Some 87% of all U.S. households buy cookies, while 95% buy crackers, with the average household consuming 20 pounds of cookes and 19 pounds of crackers.

Last year, Nabisco's bakery products had sales of over $1.5 billion, and operating income of $225 million.

Also, because of its size and the volume of its cookie business, Nabisco is able to be a low-cost producer. And the quality of its products is high. Some analysts speculate that Nabisco won't be hurt in the forthcoming cookie war. They point out that the new rivals are offering soft, moist cookies which compete more with the type of cookies Keebler offers. Nabisco's market is hard cookies.

In any event, Nabisco is stepping up its marketing program. For 1983, the company's investment in marketing U.S. bakery products will be "even larger" than the $100 million invested last year. And for good measure, the company is plotting a counter-attack on Frito-Lay's territory, the $6.6 billion market for potato chips, pretzels, cheese puffs and similar snacks. FE

Chilton's
Food Engineering
September 1983
$3.00

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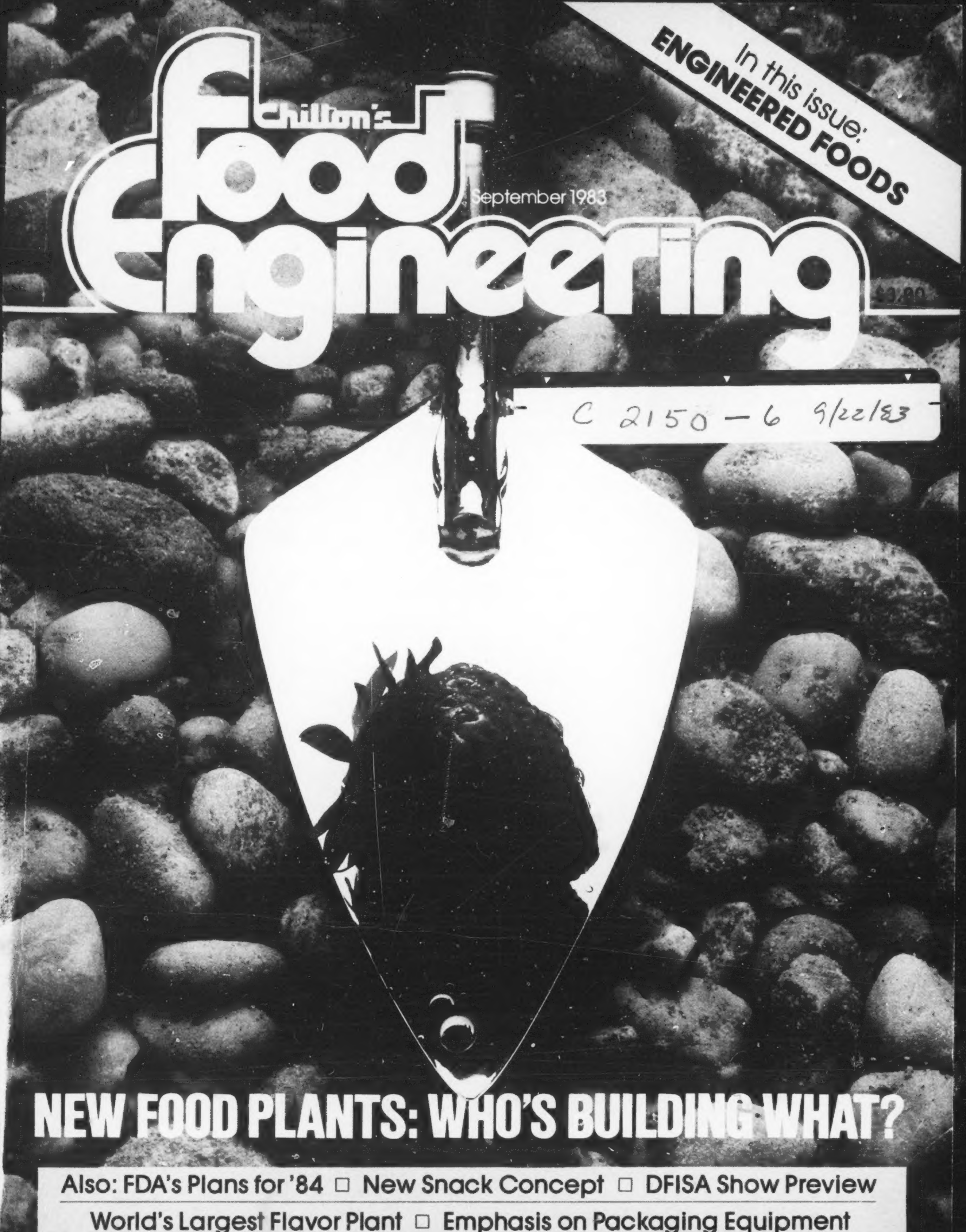

NEW FOOD PLANTS: WHO'S BUILDING WHAT?

Also: FDA's Plans for '84 □ New Snack Concept □ DFISA Show Preview
World's Largest Flavor Plant □ Emphasis on Packaging Equipment

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FE Highlights

COVER STORY: This special report lists some 200 new food plants and major expansions that have come on-stream in 1983, or are presently under construction.
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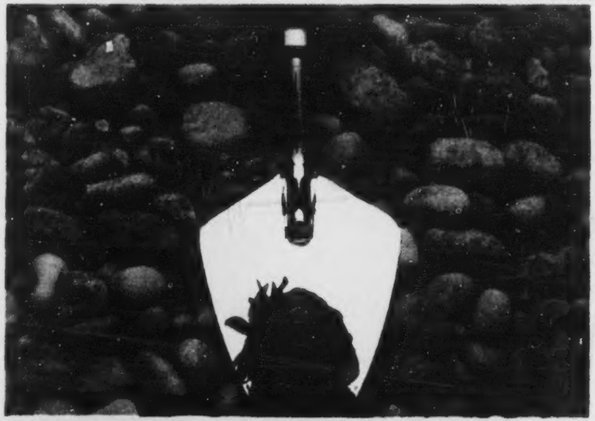

WORLD'S LARGEST FLAVOR PLANT: IFF's new $25 million, 280,000 sq ft plant in New Jersey features "satellite" production facilities for efficient production.
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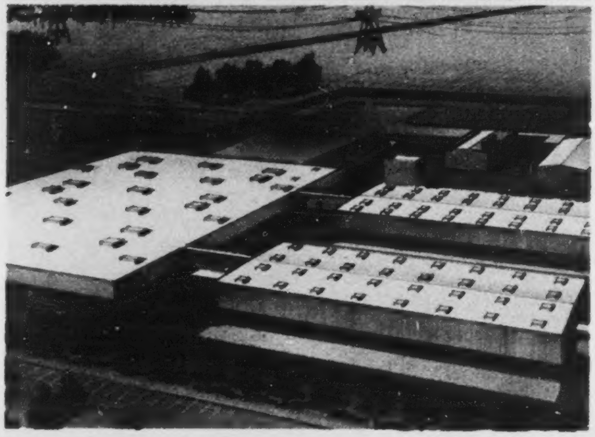

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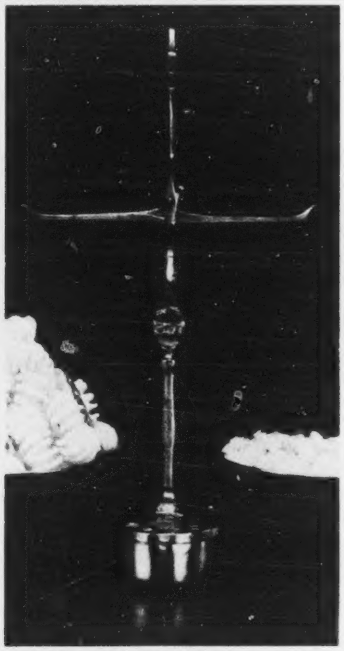

NEW SNACK CONCEPT: Pre-extruded pellets with intricate shapes offer some new opportunities for processors.

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MICROWAVE PACKAGE: Specially-designed container is expected to solve a host of problems for vending machine/microwave foods.

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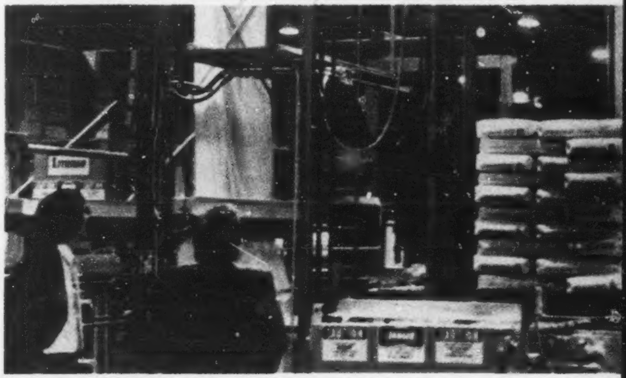

$2 MILLION PACKAGING LINE: New system at American-Maize Products Co. employs programmable robotics in bagging and palletizing. Faster speeds, improved efficiency, less labor and reduced damage are among the benefits.

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FOOD ENGINEERING® (ISSN 0193-323X) Sept. 1983, Vol. 55, No. 9. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies, Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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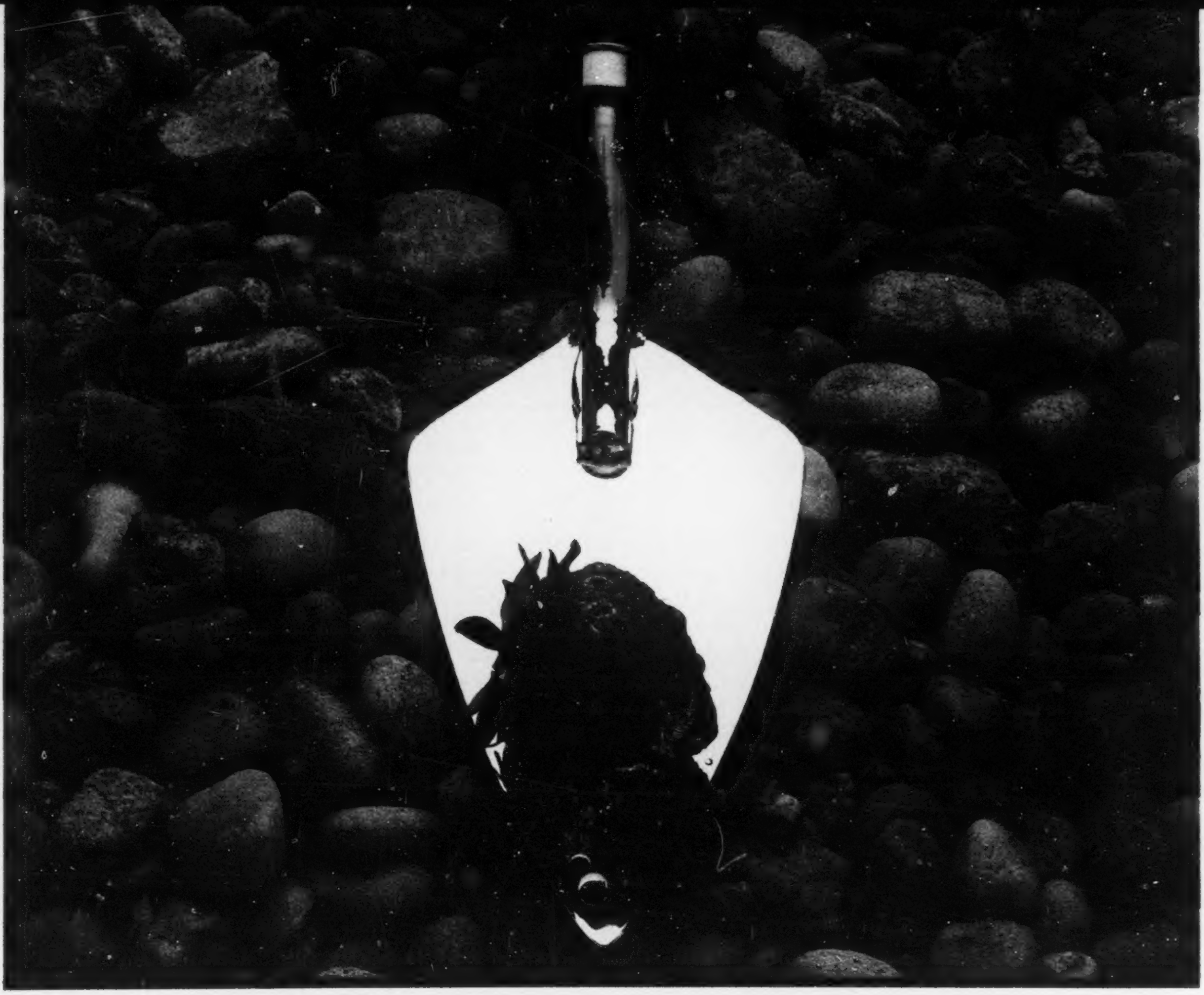
POSTMASTER: Send form 3579 to Food Engineering, Post Office Box Number 1152, Riverton, N.J. 08077.

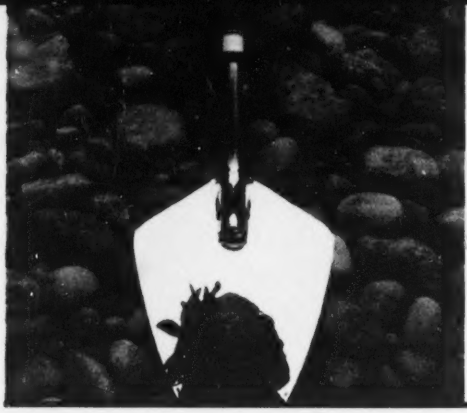


New Food Plants: Who's Building What

FE's sixth annual listing of new food plants and expansions indicates food companies are taking a more aggessive position on construction.

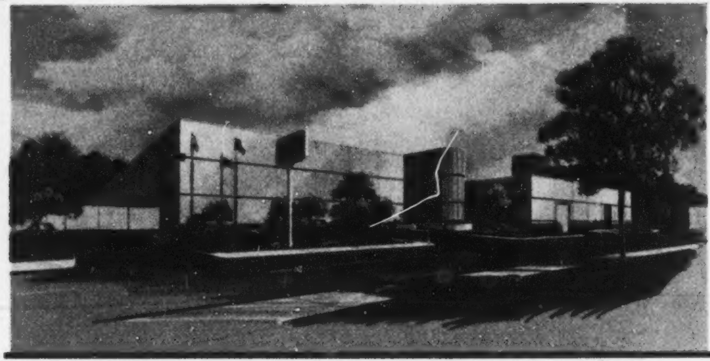
The stock market doldrums of this summer reflect the uncertainty investors perceive in the economy. Will interest rates stay down, or will they rise again and stifle the recovery? With an election year coming up, odds now favor government doing all in its power to keep them from going up too much, and if this strategy holds then the second stage of the recovery—led by industrial capital spending—should get off the launching pad late this year and early 1984. *Food Engineering's* tabulation of new construction and plant expansion this year supports this scenario. For the first time in two years, food companies appear to be taking a more aggressive position with regards to major construction projects. Projects totalling about $3 billion are either in the works or close to groundbreaking. Last year we reported on 180 projects worth about $2.6 billion, a figure that had not increased from 1981. The following pages contain information on over 200 projects involving food companies.

Recent Commerce Department figures concur with this brighter picture. After gloomy first and second quarter forecasts, the agency is now predicting a 4.3 percent quarterly gain for all industry capital spending this year. Robert Ortner, chief economist at Commerce says that he finds this increase "remarkable" and he believes the end of the capital spending slide is indeed around the corner. *(Please turn the page)*



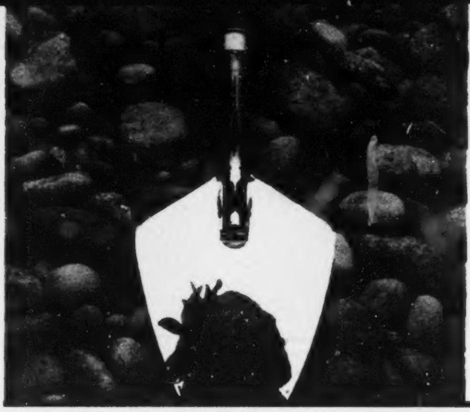
New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
			A				
A.C. Packing Company	Arkansas City, KS	Meat products	110,000	5.0	250	—	March 83
Albaco Foods	Alma, GA	Batters & Breadings	28,000	3.5	—	—	—
Aldi	Olathe, KS	Retail food distribution	220,000	6.0	75	—	June 84*
American Candy Mfg. Co.	Selma, AL	Hard candy	—	3.5	100	—	May 83
American Frozen Foods	Stratford, CT	Beef, poultry & pork	68,800 (Renovation)	8.6*	—	Webber/ Smith Assoc., Lancaster, PA	Fall 83
Anheuser-Busch	Houston, TX	Beer & malted beverages	—	100.0	440	—	June 83*
	Robersonville, NC	Peanut products	—	4.0	—	—	Feb. 83*
	Syracuse, NY	Beer	1,500,000	200.0	650	—	Feb. 83
Archer-Daniels Midland	Decatur, IL	Soybean oil, meal & flour processing	15,000 (Expansion)	1.5	—	—	83*
Atlantic Cold Storage	Boston, MA	Frozen food distribution ctr.	55,000 (Expansion)	1.1	10	—	March 83
Au Bon Pain	Boston, MA	Croissants	31,000	3.9*	—	—	Sept. 84*
			B				
Mrs. Baird's Bakeries, Inc.	Houston, TX	Bread, buns	153,000	—	—	The Austin Co., Cleveland, OH	84
Bake Line Products	Des Plaines, IL	Cookies	106,000	13.6*	—	—	June 83*
Beatrice Foods Corp.	Vernon, CA	Cold storage plant	55,350	4.3	100	—	April 83
Bil-Mar of Iowa	Storm Lake, IA	Meat processing	7,000	5.0	—	—	April 83
Biokyowa, Inc.	Cape Girardeau, MO	Amino acids	—	25.0	—	The Austin Co., Cleveland, OH	April 84
Bismark Egg	Bismark, ND	Egg laying operation	—	1.7	6	—	Sept. 83*
Borden/ Creamette	Tolleson, AZ	Pasta	50,000	8.0	—	—	April 83*
Martin Brower	The Woodlands, TX	Fast foods distribution	50,000	6.3*	100	—	July 84
Buffalo Rock Co.	Birmingham, AL	Bottling plant	—	1.5	10	—	May 83
			C				
CFS Continental	Texarkana, AR	Bakery	—	3.3	20	—	June 83*
Campbell Soup	Camden, NJ	Spaghetti sauce	40,000 (Expansion)	2.0	—	—	Early 83



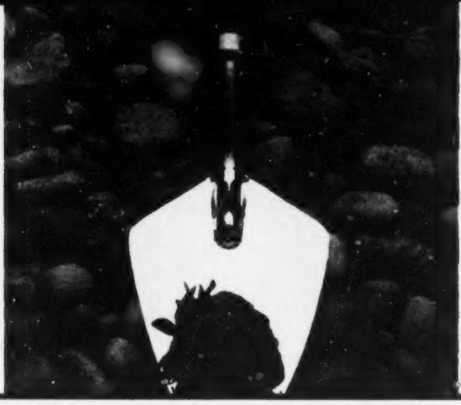
International Trading Company's new "deli" products facility designed by Sverdrup Corp.

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employees	Architects Engineers	Scheduled On-Stream
	Dublin, GA	Mushrooms	—	6.0	100	—	June 83*
	Omaha, NB	Frozen dinners	—	—	400	—	Aug. 83*
Cando Egg	Cando, ND	Egg laying operation	—	2.2	20	—	Sept. 83*
Cargill	Eddyville, IA	Corn wet milling	—	100.0	—	PSI Process Systems, Memphis, TN	Early 85
Carmel Candy Factory	Anthony, TX	Hard candies	35,000	2.5	150	—	Sept. 83*
Carnation	St. Joseph, MO	Pet foods	33,000	4.1	50	—	April 83
Chateau Elan	Jackson Cty., GA	Wine	—	3.0	—	—	June 83*
Cimpl Packing Company	Yankton, SD	Beef processing	(Expansion)	5.0	—	—	Sept 83*
Clement Pappas	Bridgeton, NJ	Fruit & vegetable processing	600,000 (Expansion)	1.8	20	—	Aug. 83
Cliffstar	Dunkirk, NY	Fruit & vegetable juices	— (Expansion)	2.4	30	—	83
Coca-Cola	Birmingham, AL	Bottling plant	—	1.7	—	—	May 83
	Monterey Cty., CA	Wine	325,000	34.0	—	—	April 83
	Montgomery, AL	Bottled soft drinks	225,000	10.0	60	—	Oct 83*
Coca-Cola Bottling	Asheville, TN	Soft drinks	(Expansion)	1.0	10	—	83
	Aberdeen, SD	Carbonated beverages	(Expansion)	1.0	—	—	Sept. 83*
	Asheville, TN	Soft drinks	(Expansion)	1.0	10	—	83
	Hagerstown, MD	Soft drink bottling	90,000 (Expansion)	11.3*	50	—	July 84*
	Montgomery AL	Soft drink bottling	300,000	10.0	50	—	July 83*
Colonial Provision Co.	Boston, MA	Meat processing	70,000	1.2	40	—	March 83
Columbian Peanut	Ozark, AL	Peanuts	20,000	1.5	60	—	83
ConAgra	Sherman, TX	Flour products	—	2.0	—	—	83*
Consolidated Foods	Claryville, KY	Processed foods	—	22.0	400	—	May 84*
Continental Grain Processing	Guntersville, AL	Soybean oil	—	1.2	—	—	May 83
Cougle Commission Co.	Chicago, IL	Poultry products	14,000	1.0	—	Johnson Architects, Inc., Hinsdale, IL	83*



New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
Creasey	Hagerstown, MD	Food distribution center	46,000	3.0	40	—	June 84
	Washington County, MD	Wholesale groceries	126,000 (Expansion)	3.0	100	—	July 84*
Crow-Farnsworth Brindell	Richland, MS	Dry groceries	—	2.5	30	—	—
			D				
D&S Sales	Caribon, ME	Potato processing	50,000	1.0	160	—	April 83
Dakota Cheese	Mitchell, SD	Cheese	9,000 (Expansion)	5.0	10	—	Sept. 83*
Dawn Food Products, Inc.	Jackson, MI	Dry bakery mixes	14,500 (Expansion)	1.0	—	Architonics/ Plummer Assoc./ Arden Engineering Assoc.	Jan. 83
Dean Foods	Henrico Cty., VA	Margarine	59,000	5.0	20	—	Sept. 83*
Dederich Corp.	Germantown, WI	Culture media & rennet	19,000 (Expansion)	2.4*	—	—	Jan. 83
Dellwood Foods	Fraser, NY	Dry milk proteins & by-products	—	3.0	20	—	June 84*
Distron Co.	Lakeland, FL	Distributor of Burger King products	33,000	4.1*	30	—	March 83
			E				
Elmhurst Milk & Ice Cream Co.	Kanona, NY	Yogurt	(Expansion)	10.0	300	—	Sept. 83
Excel Corp.	Cazad, NB	Meat packing	(Expansion)	30.0	—	—	Dec. 84*
	Dodge City, KS	Boxed beef	220,000	—	600	—	May 83
			F				
Falstaff Brewing Corp.	Ft. Wayne, IN	Beer & beer cans	60,000 (Expansion)	6.0	150	—	Fall 84*
Flavorite Laboratories, Inc.	Horn Lake, MS	Seasonings	45,000 (Expansion)	5.6*	—	—	—
Fleming	Salt Lake City, UT	Food distribution ctr.	(Expansion)	18.7	—	—	June 84
Flowers Baking Co.	Miami, FL	Baked goods	(Expansion)	8.0	121	—	83*
Folger Coffee	New Orleans, LA	Coffee	—	3.0	—	—	June 83*
Franklin Baking	Goldsboro, NC	Bakery	45,000	5.0	100	—	June 83*
Frito-Lay	Bakersfield, CA	Food Processing plant	—	70.0	1000	—	Oct. 84*
	Casa Grande, AZ	Food products	115,000	14.4*	—	—	May 84*



New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
	Casa Grande, AZ	Snack chips	110,000	13.8*	—	Fruco Engineers, Inc., Ballwin, MO	Late 84
Furman Canning Co.	Northumberland, PA	Canned vegetables, tomato products	35,000	1.9	—	John M. Kostecky Jr. & Assoc., Wormleysburg, PA	Jan. 84
			G				
Gamble Properties	Portland, OR	Soft drinks	(Expansion)	1.7	—	—	Sept 83*
General Coffee Corp.	Miami, FL	Coffee	(Expansion)	3.5	90	—	83*
General Foods (Leasing)	Bedford Park, IL	Food distribution Ctr.	221,000	27.6*	—	—	Feb. 83
Gioia Macaroni	Buffalo, NY	Macaroni	51,000 (Expansion)	11.6	45	—	April 84*
Gold Bond Ice Cream	Hagerstown, MD	Ice cream	—	4.5	250	—	June 84*
Gold Shield Foods	Maybrook, NY	Ice cream & frozen desserts	20,000	5.0	16	—	Sept 83*
Golden Flake Snack Foods	Birmingham, AL	Fried pork skins	—	3.5	6	—	May 83
Goodchaux-Henderson Sugar Co.	Reserve, LA	Refined cane sugar production	(Expansion)	25.7	50	—	83
Graceland Gardens	Clark, SD	Potatoes	66,000	3.0	30	—	March 83
Grain Fed Fish	Indianola, MS	Processed catfish	—	4.0	375	—	April 83
Great Lakes Potato	Dansville, MI	Potatoes	—	1.0	500	—	Sept. 84*
B. Green & Co.	Baltimore, MD	Groceries distribution ctr.	—	1.8	—	—	May 83
			H				
H&S Bakery	Baltimore, MD	Baked goods	23,000 (Expansion)	1.2	50	—	83*
Haarman & Reimer Flavor Div.	Branchburg, NJ	Food flavorings	42,000	6.0	—	Cruce Assoc.	Oct. 83
Hardee's	Salisbury, NC	Frozen foods distribution ctr.	—	3.5	45	—	April 83
Heinz U.S.A.	Holland, MI	Pickles, relish & baby foods	(Expansion)	1.0	—	—	Mid 83
Heluva Good Cheese	Sodus, NY	Cheese	44,000 (Expansion)	5.5*	—	—	June 84
Hester Industries	Moorefield, WV	Pre-cooked & frozen chicken products	—	2.0	—	—	Sept. 83

New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
H P Hood	Boston, MA	Dairy products	662,000	19.5	971	—	—
Hooten Chocolate	Newark, NJ	Cocoa products	(Expansion)	3.6	—	—	June 84*
Howard Johnsons	Auburn, ME	Food processing	20,000	5.0	10	—	April 83
			I				
Interbake Foods	N. Sioux City, SD	Cookies	(Expansion)	1.0	100	—	
International Cheese Co.	Hinesburg, VT	Cheeses	48,000 (Expansion)	6.0	—	Sverdrup & Parcel Assoc., St. Louis, MO	Late 83
International Trading Co.	Houston, TX	Sliced ham & distribution of deli products	55,000		175	Sverdrup Corp. Design/ Build	Sept. 83
ITT Continental Baking Co.	Hodgkins, IL	Breads, buns, rolls, muffins	200,000	20.0	—	A. Epstein Co.'s, Chicago, IL	Spring 83
	Pomona, CA	Bread & rolls	167,000	9.0	—	Lockwood Greene Engineers, Inc., New York, NY	Fall 83
International Trading	Houston, TX	Packaged meats	50,000	6.2*	—	—	July 83*
Iowa Beef Processors	Emporia, KS	Meat packing	44,715 (Expansion)	2.6	—	—	83*
			J				
Jax Liquors	Jacksonville, FL	Liquor warehouse	63,000 (Expansion)	1.5	10	—	83*

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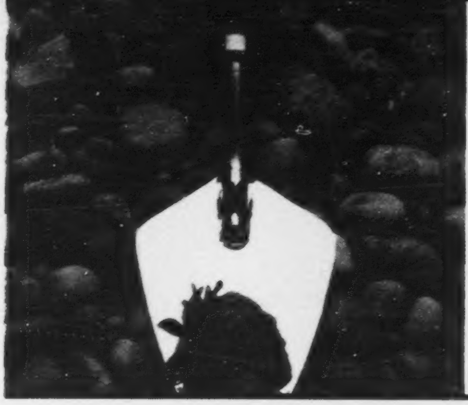
New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
Jays Foods	Bellwood, IL	Snack foods	42,000	5.3*	—	—	Sept. 83*
			K				
Kellogg Co.	Pottstown, PA	Convenience foods	—	2.0	99	—	Late 83
King Shrimp Co.	Brunswick, GA	Seafood processing	—	—	200	—	83*
Kroger Co.	Batesville, MS	Frozen foods distribution ctr.	—	4.5	80	—	June 83*
	Crawfordsville, IN	Cheese	110,000	16.5	300	—	Mid 83
	Pontiac, SC	Teas, spices & coffees	210,000	19.0*	100	—	Dec. 83
	Winchester, KY	Dairy products	—	22.0	150	—	83*
			L				
Land O'Lakes	Kent, OH	Butter & margarine	120,000	33.6*	—	—	Jan. 83
	Volga, SD	Stirred curd cheddar cheese	(Expansion)	3.5	—	—	Sept. 83*
Lauderdale Farms Co.	Florence, AL	Pork processing	—	4.0	60	—	May 83
Legal Seafoods	Boston, MA	Processed seafood	75,374	1.2	114	—	83
Lone Star Brewing Co.	San Antonio, TX	Beer	—	3.6	—	—	83
Lotte USA	Battle Creek, MI	Confections	50,000	6.3*	50	—	Aug. 84*
Louisville Edible Oil Products	Louisville, KY	Edible oil products	—	2.5	120	—	June 83*
Lucky Stores Inc./ Lady Lee Dairy	Sacramento, CA	Milk	43,000	5.4*	—	Edward A. Bonelli & Assoc., San Francisco, CA	Jan. 84
Lundy Packing Co.	Clenton, NC	Pork processing	156,000	—	—	Patterson Enterprises	Dec. 83
Lykes Brothers	Plant City, FL	Food & meat packing	55,000 (Expansion)	7.0	950	—	83*
			M				
Mah Chena Corp.	Chicago, IL	Frozen foods	90,000 (Expansion)	—	—	—	83*
Malone and Hyde	Southhaven, MS	Food wholesaler	500,000	63.0*	—	—	June 83*
Markstein Beverage Co.	Oakland, CA	Beverage distribution	—	3.0	—	—	83*
Marriott Corp.	Columbia, MD	Food distribution ctr.	130,000	5.0	50	—	83
Martin-Brower	The Woodlands, TX	Fast foods	50,000	6.3*	100	—	July 84*



New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employees	Architects Engineers	Scheduled On-Stream
McLane-Pacific	Merced, CA	Grocery distribution	150,000	7.0	110	—	Oct. 83*
Merchants Refrigerating	Modesto, CA	Frozen foods	62,000 (Expansion)	4.5	12	—	June 83*
Merico	Ft. Payne, AL	Snack cakes	—	1.5	40	—	May 83
Mermaid Ind.	Tacoma, WA	Fish products	20,000	2.5*	25	—	Aug. 83*
Fred Meyer	Portland, OR	Grocery office	—	12.0	—	—	Sept. 84*
Mid Central/ Sysco Food Services	Olathe, KS	Institutional foods distribution	144,000	6.8*	253	—	83*
Mid-Valley Dairy Co.	Fairfield, CA	Milk	50,000	6.3*	—	Edward A. Bonelli & Assoc., S[illegible] Francisco	June 83
Midwest Whole Grocery	Omaha, NE	Grocery distribution	—	1.5	75	—	Oct. 83*

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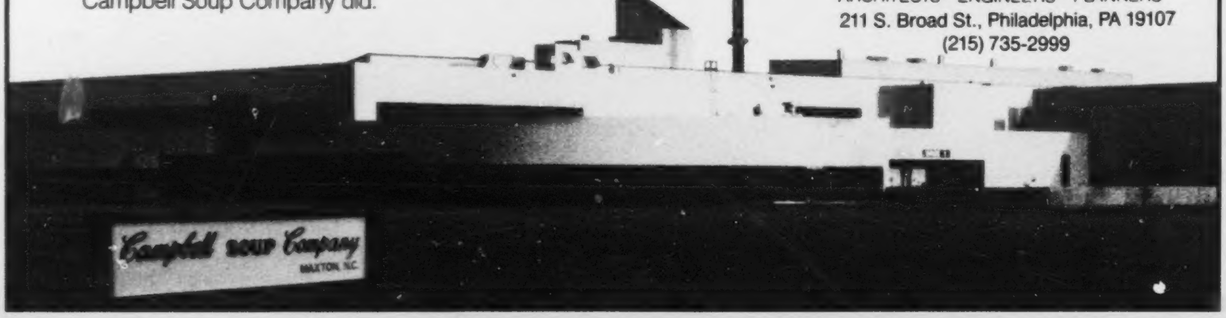

New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
Mid-Wisconsin Beverage	Wausau, WI	Soft drinks	60,000	2.5	4	—	83
Montfort of Colorado, Inc.	Grand Island, NE	Beef processing	70,000 (Expansion)	6.5	—	In-house	—
Morrison Milling Co.	Denton, TX	Flour, cornmeal & dry mixes	14,000 (Renovation)	1.8*	—	Buhler-Maig., Houston, TX	Sept. 83
N							
Nabisco Brands	Chicago, IL	Bakery goods warehouse	70,000	1.5*	—	—	83*
Nalley's Fine Foods	Tacoma, WA	Meat packing	—	15.0	1000	—	83*
National Beef Packing	Liberal, KS	Processed meats	—	15.0	200	—	July 83*
National Fruit Product Co.	Lincolnton, NC	Apple juice	118,000 (Expansion)	2.7	30	—	83*
National Sun, Div. of I.S. Joseph	Enderlin, ND	Sunflower seeds	—	40.0	60	—	83*
New England Milling	Ayer, MA	Wheat	—	11.0	—	—	July 83*
New Hampshire Distributors	Concord, NH	Beverage distribution	86,000	10.8*	60	—	June 83*
New Zealand Milk Products	Sioux Falls, SD	Protein food ingredients	33,000 (Expansion)	1.0	3	—	Sept. 83*
Niagra Candy & Ice Cream	Buffalo, NY	Confectionery products	—	1.5	70	—	May 84*
Nobel, Inc.	Albuquerque, NM	Meats, dairy products, dry & frozen foods	214,000	6.0	—	Glover-Smith-Nixon-Bode, Inc., Oklahoma City, OK	83*
Nutrisearch Co.	Winchester, KY	Bakers yeast, whey proteins	25,000	3.1*	—	Hixson Architects/Engineers & Gray Construction Co., Cincinnati, OH	Spring 85
O							
Ocean Spray Cranberries	Sulphur Springs, TX	Bottled juices	44	2.5	30	—	Feb. 83
Ore-Ida Foods	Wethersfield, CT	Frozen diet foods	20,000 (Expansion)	1.5	—	St. Onge Ruff & Assoc., York, PA	Oct. 83
Oscar Mayer	Chicago, IL	Meat products	21,000	2.6*	—	—	July 83*
	Perry, IA	—	—	1.0	—	—	83
P							
PVA Monarch	Baltimore, MD	Food distribution	18,000 (Expansion)	1.8	15	—	—
Peerless Confection	Chicago, IL	Candy	44,000	5.5*	—	—	Aug. 83*
Pepsi-Cola Bottling	Aberdeen, SD	Carbonated beverages	(Expansion)	5.0	1	—	Sept. 83*
	Colonie, NY	Carbonated beverage production & distribution	120,000	8.0	—	—	83
	Huron, SD	Carbonated beverage distribution center	(Expansion)	5.0	—	—	Sept. 83
	Versailles, KY	Soft drinks	—	2.1	—	—	83

New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
PepsiCo	Somers, NY	Soft drinks & snack foods	400,000	50.0	—	—	June 84*
Penobscot Frozen Foods	Belfast, ME	Processed potatoes	36,000	1.0	130	—	April 83
Perdue Farms	Halifax, NC	Broiler hatchery	127 acre site	4.8	75	—	Early 83
The Pillsbury Company	City of Commerce, CA	Wheat flour	13,000	1.6*	—	Fox Engineers/ Henry Simon Inc, England/Bernards Brothers, Inc.	May 83
Pioneer Hi-Bred International	Aurora, NB	Seed corn & soy beans	—	4.6	100	—	June 84*
Powell Conveyors, Inc.	Riviera Beach, FL	Wholesale food distribution	65,000 (Expansion)	2.0	80	—	83*
Prarie Farms Dairy	Lebanon, IL	Dairy products distribution ctr.	42,000	1.2	35	—	Aug. 83*
Publix Supermarkets	Jacksonville, FL	Food distribution	210,000 (Expansion)	3.5	60	—	83*
Q							
Quaker Oats	Danville, IL	Food & mixes production	100,000 (Expansion)	14.0	135	—	83
R							
Red River Commodities, Inc.	Fargo, ND	Sunflower nutmeats	35,500 & Storage	4.2	—	T.E. Ibberson	Jan. 83
Refrigerated Distribution	Philadelphia, PA	Cold storage & distribution	285,000	3.8	40	—	83
Reiter Dairy	Akron, OH	Dairy products	52,000	1.2	12	—	June 83*
Rich Food Products	Murfreesboro, TN	Food production	—	—	—	—	Sept. 83*
Roquette Corp.	Gurnee, IL	Sorbitol	—	20.0	—	—	83
Ross Poultry Breeders	Elkmont, AL	Poultry processing	—	2.0	50	—	May 83
S							
Schmidt Baking	Baltimore Cty., MD	Bread, rolls	48,000	6.0	85	—	Late 83
Seabrook Bros. and Sons	Upper Deerfield, NJ	Frozen foods	230,000 (Expansion)	1.2	15	—	July 83*
G.D. Searle	Augusta, GA	Aspartame	—	100.0	—	John Brown Construction/ Engineering, Stamford, CT	Early 85
	Park Forest South, IL	Aspartame	160,000 (Expansion)	50.0	200	—	Jan. 83
Shaws	Wells, ME	Supermarket warehouse	225,000	8.0	100	—	Sept. 83

New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employees	Architects Engineers	Scheduled On-Stream
Shelf Stable Foods	Evansville, IN	Meat entrees & fruits	—	1.5	100	—	Feb. 83
Skylark Meats	Omaha, NE	Meat processing	65,000	1.5	18	—	June 84*
Southern Cotton Oil	Natchitoches, IA	Cottonseed oil	—	1.2	—	—	June 83
Specialty Food Sales	Jefferson, LA	Food distribution center	—	580.0	61	—	April 83
Spice World, Inc.	Orlando, FL	Spice distribution	65,816	1.7	50	—	83*
A.E. Staley	Loudon, TN	Corn oil, corn syrup & ethanol	725,000	250.0	—	Daniel International Corp., Greenville, SC	April 83
Stemilt C.A.	Wenatchee, WA	Fresh fruit warehouse	—	2.9	—	—	June 84*
Stouffer Foods	Gaffney, SC	Frozen entrees	80,000 (Expansion)	13.1	200	Webber/Smith Assoc., Inc. & Suitt Construction Co., Lancaster, PA	Winter 83
	Solon, OH	Frozen foods (pilot plant)	4,800	1.5	—	—	Early 83
Sun Products Processing	Ipswich, SD	Sunflower processing	—	2.5	2	—	March 83
T							
Tama Meat Packing Corp.	Tama, IA	Meat processing	—	1.0	16	—	Oct. 83*

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New Food Plants . . .

Company	Plant Location	Primary Product	Square Feet	Est. Cost ($-Millions)	Employ-ees	Architects Engineers	Scheduled On-Stream
Tampa Maid	Tampa, FL	Seafood freezer	24,000	2.25	—	—	—
Tangipahoa	Hammond, LA	Food distribution center	—	10.0	405	—	Oct. 83*
Terk Distributing	Odessa, TX	Liquor	51,000	1.2	10	—	June 84*
Turner Fisheries	Boston, MA	Raw fish & shellfish production	15,000	1.1	29	—	83
U							
United Foods	Albany, OR	Frozen vegetables	(Expansion)	3.0	50	—	Sept. 84*
Universal Foods	Milwaukee, WI	Food products research facility	24,000	1.5	4	—	June 83*
Utz Quality Foods, Inc.	Hanover, PA	Potato chips	250,000 (Expansion)	12.0	—	—	Spring 83
W							
Webber Farms, Inc.	Cynthiana, KY	Sausage processing	—	1.0	—	—	83*
Westover Dairy	Lynchburg, VA	Milk, juices & cultured products	10,400 (Expansion)	1.3*	—	Hixson Architects/Engineers, Cincinnati, OH	Spring 83
Wyeth Nutritionals, Inc.	Georgia, VT	Nutritional products	132,000	30.0	—	Davy McKee Corp., Chicago, IL	Fall 83

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October 1983

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Also:
Interview with Arthur Hayes • The Sulfite Controversy
Evaporator Saves $3 Million • Aseptic Bags & Pouches

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ASEPTIC BAGS: Some exciting things are happening with new packaging systems at Nelson's Dairy in Toronto.

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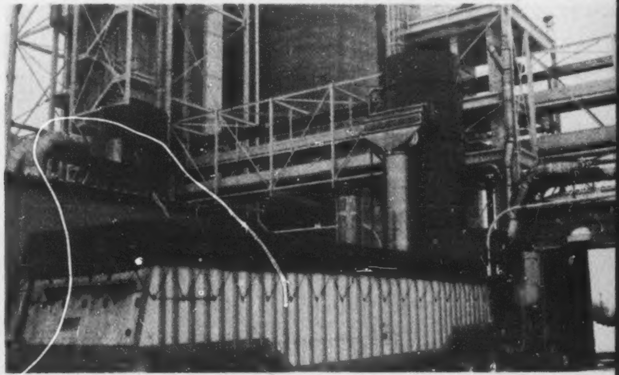

PC's AUTOMATE GRAIN HANDLING: New $22 million facility employs programmable controllers to automate operations (page 142). This is one of 6 case-history articles in this issue describing improved "handling & distribution" techniques, beginning on page 138.

FOOD ENGINEERING® (ISSN 0193-323X). Oct. 1983, Vol. 55, No. 10. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office.
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Chilton's Food Engineering
October 1983

SHAKE WELL
NATURE VALLEY
NEW 100% NATURAL
Light & Crunchy
GRANOLA SNACK
OATS & HONEY
HAWAIIAN PUNCH
ISLAND FRUIT COCKTAIL
Hi-C
Orange Drink
Duncan Hines
Chocolate Chip
DINNER
HIGH PROTEIN
NO SALT ADDED
Del Monte
QUALITY
KERNEL CORN
NO SALT ADDED
Croissants
ALL BUTTER
PEPPERIDGE FARM
NET WT. 4 OZ. (113g)
Lite
Chicken of the Sea
Made in USA

3rd annual...

New Products Analysis

Over the past year, 818 different companies introduced a total of 3,367 new food products. Campbell Soup led the way with 95 items.

DIANNE L. TAYLOR, Assistant Editor

(Please turn the page)

During the period July 1982 through June 1983, *Food Engineering* recorded a total of 3,367 new food products entering the marketplace. Again, like last year, most of the emphasis in "new" products is in line extensions, reformulations, and new flavors. Most of the major food companies are capitalizing on existing brand names that allow for better consumer identification.

Kenneth Carlson, vice president of marketing for the A.C. Nielsen Company, points out: "Some observers of the new product scene argue that 'item proliferations' should not be considered in the new product category at all, since they are not *really* new products. If that's the case, you would not consider as new, developments such as Post adding raisins to their Grape Nuts, Oscar Mayer adding cheese to their Weiners, Lipton's Tea Bags going Herbal, or Kraft offering Velveeta slices *and* Soft, Spreadable Philadelphia Brand Cream Cheese. Those items are not only new, but in my opinion, they are *significantly* new.

"Think for a moment how long you have known about these products. Those brands are all mature by any standard, yet as recently as 1982, they were being given a fresh look. That's what we call successfully rejuvenating mature brands, and I consider that the highest form of the product manager's art."

In addition to the examples cited by Carlson, consider these products:

- General Mills' Cheerio's extension, Honey Nut Cheerios, has achieved increased volume each year since its introduction in 1979. It now ranks eighth in dollar sales among all cereals and "represents the market's most important new product introduction in more than a decade," according to General Mills. The two products combined hold more than a seven percent share of today's cereal market.
- Ocean Spray Cranberries, Inc., too, found a success in a line extension. The company added apple juice to its aseptic Paper Bottle line. "Sales of the Paper Bottle were greatly enhanced by the introduction of Apple Juice during the year," reports the company. "Apple juice exceeded our own expectations by 20 percent, and we see its addition to be a great plus for our nonmember business."
- PepsiCo's two new Pepsi-Cola extensions, Pepsi-Free and Sugar Free Pepsi-Free, are termed "one of the key product developments" for the company. The products have reportedly increased sales within the total cola segment and are expected to help increase the company's overall share in the soft drink market. Another line extension has proven itself worthwhile for PepsiCo. The company's Frito-Lay subsidiary expanded its tortilla

How they rank with new products

1983 Rank	1982 Rank	Company Name	New Products Introduced for 1983*
1	4	Campbell Soup Company	95
2	2	Borden, Inc.	84
3	3	General Mills, Inc.	64
4	10	Thomas J. Lipton, Inc.	63
5	7	Beatrice Foods Company	61
6	11	Consolidated Foods Corp.	58
7	12	Nabisco Brands U.S.A.	56
8	44	George Weston Ltd. (Interbake Foods & Stroehmann Brothers)	52
9	33	R.J. Reynolds, Inc.	47
10	15	The Coca-Cola Company	46
11	5	The Pillsbury Company	42
12	8	H.J. Heinz Company	41
	1	General Foods Corp.	41
14	13	IC Industries (Pet, Inc.)	36
15	44	Agway (H P Hood)	33
16	17	Dart & Kraft, Inc.	31
	19	Carnation Company	31
	13	International Multifoods	31
19	—	Ogden Food Products Corporation	27
20	24	Tri-Valley Growers (S&W Fine Foods)	26
21	9	Kellogg Company	25
	22	Esmark, Inc. (Swift & Company)	25
23	38	Ralston Purina Company	24
24	33	American Home Products Corporation	22
	20	PepsiCo, Inc.	22

** New food products introduced by major food companies during the period July 1982 through June 1983.*

The packaged cookie 'war' continues, with 126 new entries into this category. Procter & Gamble, among others, has entered the battlegrounds for the first time, offering a unique dual texture cookie which they consider to be superior.

chip business with Doritos brand Crispy Light Tortilla Chips. The products reportedly show strong sales trends and solid potential for future growth. And an extension to Fritos Corn Chips, Fritos Brand Light Corn Chips, also achieved strong sales trends in national distribution.

- Del Monte developed and introduced a new and improved line of Patio dinners and Patio burritos, which "sharply increased the company's share of the frozen Mexican food business."

Underlying trends

Trends in new food product introductions tend to overlap, and cannot be easily categorized without duplications. For instance, sauces and gravies and light foods are two areas of great activity this year. However, many of the light food items are sauces and gravies; and many of the sauces and gravies can also be considered light foods. While *FE* busily added up all of the introductions in condiments, canned foods, and sauces and gravies, we found many Mexican foods in those segments as well.

These underlying trends play an important role in analyzing trends. Consumer spending patterns have changed in recent years, says the U.S. Department of Commerce; and so must the types of new products that appear on the market. More elderly persons and an increase in smaller families have produced changes in the demand for food products. Growing consumer interest in nutrition and health has played a part here, as well.

So, here is a summary of those new product trends which lurked underneath all of the "primary" trends, yet play an important role

(Continued on next page)

1983 Rank	1982 Rank	Company Name	New Products Introduced for 1983*
24	6	The Nestle Company	22
27	—	Geo. A. Hormel & Co.	21
	—	Anheuser-Busch Companies, Inc.	21
	—	MBC Beverages	21
	—	Sun-Diamond Growers of California	21
	24	Warner-Lambert Company	21
32	—	The Procter & Gamble Company	20
33	—	Joseph E. Seagram U.S.A.	19
34	—	Buitoni Foods Corp.	18
	—	Interstate Brands	18
	28	United Biscuits (Keebler)	18
	30	Curtice-Burns, Inc.	18
38	—	Leaf Confectionery, Inc.	16
39	28	The Quaker Oats Co.	15
	—	Norton-Simon, Inc.	15
	20	SCM Corporation	15
	—	McCormick & Co., Inc.	15
43	—	Knudsen Corporation	14
44	—	Dean Foods	13
	—	CPC North America	13
46	—	Lever Brothers	12
	—	American Brands	12
	—	Continental Grain (Oroweat Foods)	12
49	—	Topps Chewing Gum Inc.	11
	—	Charles Friehofer Baking Company, Inc.	11

** New food products introduced by major food companies during the period July 1982 through June 1983.*

New food products . . .

in analyzing the needs of today's consumer.

Mexican foods

- *Mexican Foods.* The Mexican food market has yet to reach its peak. It is one of the fastest growing specialty foods areas in America. IC Industries' Pet, Inc. estimates the total U.S. Mexican foods market at $700-million, with the non-frozen Mexican foods market totalling about $500-million. Old El Paso increased its sales by 18 percent in 1982 over 1981 and has introduced a new line of frozen Old El Paso Mexican entrees in St. Louis and Dallas.

According to Del Monte, the Mexican food market is growing at an annual rate of 21 percent. Patio Crispy Burritos in single-serve bags, and Patio Burrito frozen complete dinners are two new Mexican products from the company which capitalize on this growing market.

Chewing gum

- *Gum.* Gum showed a marked increase in *FE*'s list of new products. Entries into the gum category jumped 40.5 percent over 1982's figures, totalling 74 product introductions. Competition appears to be the key here, since gum is a low growth industry. Eight new gum products were introduced by the Wm. J. Wrigley Jr. Company, including four flavors of Tidal Wave Bubble Gum. The liquid center gum is reportedly in national distribution, with boosted marketing expenditures backing it.

General Mills' Donruss came out with four new gum items: 1983 Baseball Cards, MASH Bubble Gum and Cards, Strawberry Shortcake Bubble Gum and NFL Football Mini-Mugs Gum. Nabisco Brands, as well, entered an extension to its Bubble Yum Line — Super Yum Bubble Gum.

Aspartame-sweetened

- *Aspartame-Sweetened Products.* Consumers are still looking for products with "less" — less sugar, for one. "Natural" foods, as well, are on the rise. So it's no wonder more companies are using Searle's *NutraSweet* brand aspartame as a sweetener in their products. The product has great consumer appeal because it can be termed a 'natural' sweetener.

Powdered beverage mixes is one area where aspartame has taken hold. General Foods' Country Time has introduced five powdered beverage mixes with aspartame: orange, lemonade, grape-berry, fruit blend, and lemon-lime. Wyler's four flavors of aspartame-sweetened drink mixes have gone into national distribution. In dry mixes such as these, the use of bulking, dispersing or solubilizing ingredients may be necessary because of the aspartame.

Two new Sugar-Free Swiss Miss products have entered the marketplace, claiming to be "the first of their kind to be marketed across the U.S." Hot Cocoa Mix and Chocolate Milk Maker comprise the two products.

Dia-Mel Gel-A-Thin Desserts from The Estee Corporation are two new products dessert mixes to contain aspartame. The products are more expensive than gelatins containing other sweeteners.

And with FDA's recent approval

Where the action is

Category	1983 Introductions*	1982 Introductions**
Baby Food	25	13
Baking Ingredients	42	34
Baking Mixes	65	21
Beer	22	24
Beverage Mixes, Powdered	57	53
Bread, Rolls, Muffins	125	74
Bread & Snack Sticks	6	20
Breakfast Cereals	35	26
Cakes, Pies	63	31
Candy, Assorted	71	104
Candy Bars	24	28
Canned and Frozen Fruits	3	15
Canned "Meals"	28	7
Canned Meats, Fish	39	21
Canned Vegetables	61	13
Cat Food	25	30
Cheese	130	54
Coffee	15	16
Condiments & Spreads	88	44
Cookies	126	88
Crackers	68	28
Dips	37	32
Dog Food	37	44
Doughnuts, Pasteries	57	34
Frozen Appetizers, Side Dishes	39	64
Frozen Bakery Products	41	56
Frozen Dinners & Entrees	114	94

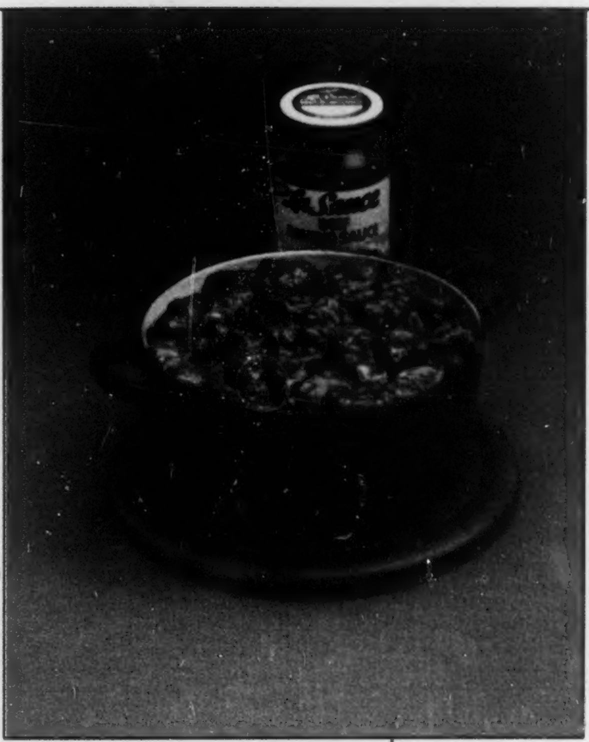
** Products introduced during the period July 1982 through June 1983.*
*** Products introduced during the period July 1981 through June 1982.*

for the use of aspartame in soft drinks, a flurry of activity has taken place in the soft drink segment. Diet Coke sweetened with NutraSweet/Saccharin blend, has been launched into Birmingham, Alabama. The Squirt Co. has introduced Diet Squirt sweetened with 100 percent NutraSweet into the market. Pepsi-Cola said it was planning announcements concerning its use of aspartame; and lastly, Royal Crown has begun marketing Sugar-Free, Caffeine-Free, Salt-Free, Diet Rite Cola sweetened with NutraSweet.

Low-sodium

- *Low-Sodium Foods.* Following on the heels of the "natural, better for you trend comes low-sodium foods. There's no doubt they've become prominent in the marketplace, just as they've showed up in almost every one of our categories this year.

Some examples: S&W Fine Foods' seven-item line of 50 percent less salt products. The line includes tomato sauce, whole peeled tomatoes, stewed tomatoes, vegetable juice cocktail, tomato juice, kidney beans, and garbanzo beans. Swift & Company has introduced Low-Sodium Colby Cheese, Reduced-Sodium Natural Swiss Cheese, Low-Sodium Natural Cheddar Cheese, and Sugar and Salt Free Peter Pan Peanut Butter. Campbell Soup has entered a low-sodium V-8 Juice into the market.



The popularity of ethnic foods, a movement toward 'participation meals', and the rise in pasta products have made the sauce/gravy segment popular. Tomato-based sauces, like Armour's La Sauce for Beef, did especially well when it comes to new product introductions.

Contents

Fe's New Products Analysis this year deals specifically with new products from major food companies. All of the products mentioned have been introduced during the period July 1982 through June 1983.

The company introducing the most new products during that time period was Campbell Soup,

(Continued on page 65)

Category	1983 Introductions*	1982 Introductions**
Frozen Ethnic Foods	28	20
Frozen Pizza	32	42
Frozen Poultry Products	25	54
Frozen Seafood	51	37
Frozen Vegetables	43	26
Gum	74	30
Ice Cream & Novelties	125	86
Juice & Juice Drinks	181	112
"Light" Foods	171	125
Liquor	22	17
Meat, Processed and/or Refrigerated	160	117
Milk	16	18
Nuts	43	31
Pasta, Rice	65	40
Popcorn	24	31
Potato Chips, Corn Chips	72	42
Pretzels	19	11
Puddings, Desserts	20	43
Salad Dressings	82	58
Sauces, Gravies	169	108
Snack Food Bars	32	34
Snacks, Miscellaneous	87	70
Soft Drinks, Carbonated	55	46
Soups	81	43
Spices & Seasonings	95	41
Tea	33	34
Water	12	12
Wine	43	18
Yogurt	64	28
Total	3,367	2,442

New food products . . .

with 95 new items. In second place was Borden with 84 new products. The new product strategies of both of those companies are discussed more fully later on in this article.

One interesting development occurred with George Weston Ltd. which shot from 44th place last year to 8th place this year, on the strength of 52 new products. Primarily, the increase was due to a new 28-item line of Stroehmann Brothers' rings, twists, strips, donuts, and cakes under the Black Forest label.

The company finishing in third place this year is General Mills. Last year, General Mills also finished third, and the year before that the company finished fourth. So "consistency" in terms of new products introductions seems to be a key word at General Mills.

The company's Consumer Foods Division has been pursuing new and existing markets with an aggressive new products program. The company calls their efforts "highly successful," mainly because of a 6.8 percent increase in domestic package food unit volume. This gain, reports the company, is about three times greater than

(Continued on next page)

Campbell Soup (95 New Products)

Campbell's

Prego Tortellini Soup
Prego Pomodoro Soup
Prego Pallottoline Soup
Prego Minestrone Soup
Prego Primavera Soup
Prego Marinara Spaghetti Sauce
Farm Fresh Tomatoes
Chunky Soup for Cooking, Thick Tomato
Chunky Soup for Cooking, Creamy Mushroom
Chunky Soup for Cooking, Creamy Chicken
Chunky Foup for Cooking, Rich Brown
Chunky Old Fashioned Chicken Soup
Comin' Home Soup and Recipe Mix, Chicken Noodle
Comin' Home Soup and Recipe Mix, Onion
Comin' Home Soup and Recipe Mix, Zesty Tomato
Comin' Home Soup and Recipe Mix, Noodle
Homestyle Chicken Noodle Soup
Homestyle Beef Noodle Soup
Franco-American UFO's
Domsea Coho Salmon With Salmon Stuffing

Juice Bowl

Cranberry Apple Juice Drink

Mrs. Paul's

Light and Natural Fish Fillets
Light and Natural Thick Fillets
Light and Natural Fillet of Sole
Light and Natural Flounder
Crispier Crunchier Fish Sticks
Crispier Crunchier Fish Fillets
Butterfly Fillet Salmon in Lemon Butter Sauce
Salmon Fillets in Almond Butter Sauce

Pepperidge Farm

Orange and Raisin Bread
Cinnamon Bread
Bran Bread with Raisins
Cinnamon Apple and Walnut Bread
Pull-Apart Loaves, Date Walnut
Pull-Apart Loaves, Wheat
Pull-Apart Loaves, White
Pull-Apart Loaves, Cinnamon-Raisin
Pull-Apart Loaves, Honey-Cinnamon
Very Thin Rye Sliced Bread
Very Thin Multi-Grain Bread
Bake-At-Home Bread, Country Rye
Bake-At-Home Bread, Our Own White
Bake-At-Home Bread, Stone Ground Wheat
Chocolate Croissants
Walnut Croissants
All-Butter Croissants
Sandwich Buns with Poppy Seeds
Bakery Section Muffins, Bran
Bakery Section Muffins, Corn
Bakery Section Muffins, Blueberry
Apricot Raspberry Snack Bars
Chocolate Chip Macaroon Snack Bar
Brussels Mint Cookies
Orange Milano Cookies
Molasses Crisp Old Fashioned Cookies
Fruit Cookies
Peanut Butter Chip Cookies
Marseilles Cookies
Star Wars Cookies, Chocolate
Star Wars Cookies, Vanilla
Distinctive Crackers, Sesame
Dinstinctive Crackers, Cracked Wheat
Distinctive Crackers, Hearty Wheat
Distinctive Crackers, English Water Biscuits
Raspberry Mocha Cake Supreme
Peach Melba Cake Supreme
Dutch Chocolate 3-Layer Cake
Grand Marnier 3-Layer Cake
Beef Delis
Pizza Delis
Mexican Delis
Chicken Classics, Chicken Teriyaki
Chicken Classics, Stuffed Chicken Breasts
Chicken Classics, Chicken Kiev
Chicken Classics, Chicken Cordon Bleu
Apple Juice

Swanson

Le Menu Beef Sirloin Tips
Le Menu Breast of Chicken Parmigiana
Le Menu Sweet and Sour Chicken
Le Menu Sliced Turkey Breast
Le Menu Pepper Steak
Le Menu Yankee Pot Roast
Le Menu Chopped Sirloin Beef
Le Menu Chicken A La King
Hungry Man Chicken Parmigiana Dinner
Hungy Hombre Bean and Beef Burrito Dinner

Vlasic Foods

Mild Kraut
Old Fashioned Bread & Butter Chunk Pickles
La Especial Mexican Sauce, Taco
La Especial Mexican Sauce, Enchilada
La Especial Mexican Sauce, Chunky Red Salsa
Win Schuler's Bleu Cheese Dressing
Win Schuler's Bar-Schips
Win Schuler's Garden Herb Cream Cheese
Win Schuler's Jalapeno Cream Cheese

◄—Circle 39 or see FEM, p. 59

New food products . . .

that of the total industry.

Heavy expenditures in support of a number of new products were discharged by the company in 1983. Media advertising and promotion expenditures, fixed assets, and new product development and introductions were all greater than in 1982.

"Many of our 1983 new product additions satisfy increasing consumer interest in more healthful, nutritious and wholesome foods," reports General Mills. Nature Valley granola snacks, new Yoplait yogurt variations, Fruit Roll-Ups and Gorton's Light Recipe fish products showed particularly strong volume growth.

Future

Continued growth will reportedly come from expanded share of market on established brands, achieved through continued aggressive marketing and "superior" product quality; an ongoing new products program in established markets; and the identification of and entry into new food market segments.

Cookies attract new companies

Cookies, cookies, cookies, and more cookies. Packaged, ready-to-serve cookie introductions reigned over any other type of snack or cracker when it comes to new product introductions/line extensions. Ranking in sixth place with 126 entries, this category deserves to be looked into.

Some 87 percent of all U.S. households buy cookies, with the average household consuming 20 pounds of cookies per year, reports Nabisco Brands. Nabisco, a leader in the cookie market with an esti-

(Continued on page 68)

Borden, Inc. (84 New Products)

Borden

Hi-Protein, Low-Fat Cottage Cheese
Unsalted Cottage Cheese
Lite-Line Diet /Health Cheese, Low Cholesterol
Lite-Line Diet/ Health Cheese, Sodium-Lite
Lite-Line Diet/ Health Cheese, Reduced Sodium
Lite-Line Potato Chips
Lite-Line Cheese Puffs
Lite-Line Tortilla Chips
Buckeye Wavy Potato Chips
Buckeye Ketchips Potato Chips
Snappy Canister Corn Chips
Snappy Canister Pretzels
Snappy Canister Nuts
Lite-Line Instant Bouillon, Chicken
Lite-Line Instant Bouillon, Beef
Slimmery Frozen Desserts
Chocolate Pudding Bars
Vanilla Pudding Bars
Banana Pudding Bars
Cookies 'n Cream Lady Borden Ice Cream
Cherry Chocolate Chip Lady Borden Ice Cream
Pecan Pie Lady Borden Ice Cream
Peaches 'n Cream Lady Borden Ice Cream
Cherry Vanilla Ice Cream
Tutti Frutti Ice Cream
Peachy Peach Ice Cream
Rocky Road Ice Cream
Mississippi Mud Sandwich
Rainbow Bars
Drinking Water
Sippin' pak Apple Juice
Sippin' pak Grapefruit Juice
Sippin' pak Grape Juice
Bama Aseptic Fruit Punch
Bama Aseptic Grape Drink
Bama Aseptic Orange Drink
Bama Aseptic Apple Drink
Frosted Aseptic Vanilla Beverage
Frosted Aseptic Strawberry Beverage
Frosted Aseptic Chocolate Beverage
Old London Whole Grain Melba Rounds
Snow's Improved New England Fish Chowder
Glazed Donuts
Bagged Chocolate-Covered Raisins
Bagged Peanut Clusters
Bagged Bridge Mix
Bagged Nonpareils
Bagged Chocolate Peanuts

Drakes

Crispy Frosted Donuts
Lemon Pies
Marble Shortcakes
Mini Swiss Rolls
Krisp & Natural

Guys

Nacho Bravo Triangle Tortilla Chips
Corn Bravo Triangle Tortilla Chips
Crispy Pork Rinds
Hot Pork Rinds
Rippled Corn Crunchies
Ridgies Barbeque Potato Chips
Ridgies Sour Cream & Onion Potato Chips
Jalapeno Cheese Dip
Nacho Cheese Dip
Cheddar Cheese Dip
Dry Roasted Canister Peanuts
Salted Canister Peanuts
Whole Cashews Canister Nuts
Cashew Halfs Canister Nuts
Deluxe Mixed Canister Nuts
Mixed Canister Nuts With Peanuts

Wise

Jalapeno Flavored Bean Dip
Deluxe Butter Rich Caramel Corn
Hot Potato Chips
Salt & Vinegar Potato Chips
Canister Cheese Balls
Canister Cheese Doodles
Cottage Fries
Peanut Butter Creme Sandwich Cookies
Chocolate & Vanilla Creme Sandwich Cookies
Rye & Cheese Cracker Snacks
Cheese Snack Crackers

Wyler's

Lemonade Drink Mix with aspartame
Tropical Punch Drink Mix with aspartame
Wild Cherry Drink Mix with aspartame
Wild Grape Drink Mix with aspartame

New food products . . .

mated 30-35 percent share, comments: "As we move ahead in 1983, we are facing substantially increased competition against our core domestic bakery business, particularly in cookies and snacks. New and intensified marketing programs will meet this competition." Four of the seven new cookie products from Nabisco include: Imported Danish Cookies, Fudge Chocolate Chip Cookies, Fudge Marble Cookies, and Chips 'N More Coconut Chocolate Chip Cookies.

Even though there have been steady annual decreases in prime cookie consumers (under 20), the battle for market share is heated, spurred-on by the addition of Frito-Lay and Procter & Gamble to this market.

According to Hector Laing, Chairman of United Biscuits, "In 1980, Frito-Lay acquired Grandma's Cookie Co. Using this company's name and products as a base for expansion, Frito-Lay has declared its intention to become a significant force in the cookie market in the U.S.A. After an initial minor loss of market share in the first Frito-Lay test market . . . Keebler quickly re-established its previous position." A tonnage increase of 3 percent produced a 0.8 percent share gain, reports the company.

Since their introduction in August, Chips Deluxe Chocolate Chip Cookies have achieved a level of success unmatched by any single cookie introduction over the past decade, says Keebler. Other product introductions from Keebler include: Grasshopper Cookies, Chipsies Cookies, Original Style Graham Crackers, and Peanut Butter Fudge Sticks.

In terms of long-term potential, Frito-Lay calls its introduction of Grandma's brand packaged cookies the most important development at the company in 1982. "Against firmly entrenched leaders in the packaged cookie market, Grandma's brand cookies quickly captured a strong position despite heavy opposition." Sixteen new Grandma's cookie products were introduced.

Sunshine Biscuits, Inc., another contender in the cookie war, reportedly had record results for 1982. The American Brands-owned subsidiary re-sized its sandwich cookie line to smaller, lower-priced packaging in most of the country. Some new products include: Double Chocolate Cremes Sandwich

General Mills (64 New Products)

Natural Fruit Flavored Trix Cereal
Chocolate Donutz Cereal
Pac-Man Cereal
Strawberry Shortcake Cereal
Hot Flash Camera Gum

Betty Crocker

Butter Pecan Snackin' Cake
Chocolate Chip Stir 'N Frost Cake Mix
Carrot Cake Stir 'N Frost Cake Mix
Supermoist Apple Cinnamon Cake Mix
Supermoist Chocolate Fudge Cake Mix
Supermoist Chocolate Chocolate Chip Cake Mix
Creamy Deluxe Chocolate Chocolate Chip Frosting
Creamy Deluxe Coconut Pecan Frosting
Coconut Pecan Frosting
Chocolate Almond Fudge Frosting
Peanut Butter Bake-A-Bar Granola Bar Mix
Oats & Honey Bake-A-Bar Granola Bar Mix
Raisin & Spice Bake-A-Bar Granola Bar Mix
Chocolate Chip Bake-A-Bar Granola Bar Mix
Apple Cinnamon Muffins
Tart Cherry Muffins
Strawberry Fruit Roll-Ups
Cherry Fruit Roll-Ups
Apple Fruit Roll-Ups
Apricot Fruit Roll-Ups
Zesty Smoked Cheddar Cheese Potatoes
Parisienne Int'l Noodles
Romanoff Int'l Noodles
Fettuccine Int'l Noodles
Stroganoff Int'l Noodles

Donruss

1983 Baseball Cards
MASH Bubble Gum and Cards
Strawberry Shortcake Bubble Gum
NFL Football Mini-Mugs Gum

Gorton's of Gloucester

Clam Chowder Condensed Stew
Light Recipe Fillet of Haddock with Butter Sauce
Light Recipe Baked Stuffed Scrod
Light Recipe Fillet of Sole with Lemon Butter
Light Recipe Shrimp Scampi with Lemon Butter
Light Recipe Fillet of Sole with Cheese Sauce
Light Recipe Stuffed Flounder
Light Recipe Lightly Breaded Fish Sticks
Light Recipe Lightly Battered Tempura Fish Sticks
Light Recipe Lightly Breaded Fish Fillets
Light Recipe Lightly Battered Tempura Fish Fillets

Nature Valley

Pineapple Fruit Squeeez Aseptic Beverage
Apricot Fruit Squeeez Aseptic Beverage
Apple Fruit Squeeez Aseptic Beverage
Grapefruit Fruit Squeeez Aseptic Beverage
Cherry Fruit Squeeez Aseptic Beverage
Apple Chewy Granola Bars
Raisin Chewy Granola Bars
Peanut Butter Chewy Granola Bars
Chocolate Chip Chewy Granola Bars
Granola & Fruit Bars
Peanut Butter Granola Bars
Chocolate Chip Granola Clusters
Honey Nut Light & Crunchy

Yoplait

Apple Cinnamon Breakfast Yogurt
Berries Breakfast Yogurt
Citrus Fruits Breakfast Yogurt
Orchard Fruits Breakfast Yogurt
Tropical Fruits Breakfast Yogurt
Pina Colada Breakfast Yogurt

Cookies, Chocolate Chocolate Chip Cookies, and a line of "Big Size" cookies.

And for the first time, Procter & Gamble has entered the packaged ready-to-serve cookie market. "We felt there was a real significant opportunity to offer consumers what we consider to be a superior cookie product," reports a company spokesperson. The cookies reportedly stay crispy on the outside but soft and chewy on the inside. P&G has developed a unique dual texture — one dough is used for the inside of the cookies and a slightly different dough makes the outside. Duncan Hines Chocolate Chip Cookies come in five varieties.

Sauces/gravies "hot" market

Sauces and gravies finished third this year, authenticating the popularity of pasta and Mexican/Oriental foods. With over 175 new introductions, this market was really "hot".

According to a spokesperson for the Association for Dressings and Sauces, "Condiment sauces appear to be doing very well. The potential for growth here is unlimited.

"Ethnic foods is one of the hottest markets right now," she points out. "With wok cooking coming along, new soy sauces, etc., people are beginning to consume these foods that have never really done so in the past. Also, people are moving toward what we call participation meals."

Kenneth Carlson, vice president of A.C. Nielsen, comments, "On the ethnic foods front, we saw Mexican foods as the most popular variety in 1982 followed by Oriental foods. This growth was especially pronounced in the sauce areas. For example, Del Monte responded by expanding their 25-item line of Mexican foods, which includes 17 sauces, into more cities. Kikkoman, as well, has their name on 14 different sauces including Tempura, Teriyaki, Sweet 'n Sour, and All Purpose."

CHICKEN ROMANOFF
CHICKEN KIEV
CHICKEN MEXICALI
CHICKEN CORDON BLEU
CHICKEN PARMIGIANA
CHICKEN LUAU

Frozen dinners have taken a turn toward 'premium' lately. Product introductions here have spiraled due to competition from items like Swift's International Chicken Entrees.

Campbell Institute for Research and Technology has helped Vlasic Foods develop a line of La Especial Mexican Sauces, currently being sold in Phoenix and Dallas test markets. Beatrice Foods' Gebhardt Mexican Foods introduced four new salsas. Carnation came out with three Nacho cheese sauces under the La Cantina label; and Kuner-Empson unveiled four Mexican sauces.

Not all sauce/gravy introductions, however, fell under the Mexican foods trend. Nearly 20 percent of these entries are spaghetti sauces; and an even greater percentage are tomato-based. Tomato-based sauces of all types, reports Carlson, were introduced in 1982: BBQ sauces, hot sauces, spaghetti sauces, and pizza sauces. Favorable tomato industry supply conditions characterized this segment of the industry.

Armour Foods entered into the market in September 1982 an extension to its La Sauce for Chicken: La Sauce for Beef. The purpose of La Sauce for Beef is to upgrade everyday, very basic cuts of beef, such as round steak and stew beef. "We have been pleased with this product's performance," comments Richard Lei, product group manager for foods. "We see future growth in the sauce category, and we see future growth in our La Sauce products themselves." There is a consumer need to do something different with meats — either to dress them up or make them more interesting for the family, Lei adds.

The following is a sample of what was debuted over FE's one-year period:

- *Portofino Northern Italian Style spaghetti sauces from American Home Foods.* These products are made with a 'touch' of wine and offered in glass carafes for upscale appeal. The company also put new Condensed Italian Starter Sauces into test markets.
- *Italian Paste.* Carnation bowed Contadina Italian paste into national markets. The product, reports the company, is "the first concentrate introduced into the large and growing spaghetti sauce market." Two flavored pizza sauces, as well, were introduced by the company.
- *No-Salt-Added products.* Spaghetti sauce, tomato sauce, and tomato paste with no salt added were entered into the market by Norton-Simon's Hunt-Wesson Foods. A five-flavor line of All-Natural Barbecue sauces, as well, were added to the company's new product introductions.

Frozen dinners go premium

Upscale, one-to-two member households is a common target aim for many processors of frozen dinners these days. The majority of the

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New food products . . .

106 frozen dinners introduced between July 1982 and June 1983 boasted a premium, quality image to the consumer, as well as convenience. This frozen 'dinner occasion' market now totals $2-billion per year.

According to SAMI statistics, single frozen dishes increased in tonnage for 18 consecutive months, ending in June 1983. SAMI tracks activity in 12 frozen food product groups, single frozen dishes being the largest category in the prepared foods product group.

Adding to Stouffer's Lean Cuisine Dinners and Armour's Dinner Classics, Joseph E. Seagram U.S.A. entered the specialty frozen dinner market for the first time in 1983 with a 10-item line of gourmet products called Feast for One. They are being distributed by a newly-formed subsidiary of Seagram, Westmount Enterprises. The products range from $4 for Stuffed Mushrooms to about $7.50 for Beef Wellington, Seafood Lasagne, and Mini Beef Roast. The generous single-serving meals are designed for the microwave and are packaged in plastic, re-useable trays.

Swanson's Le Menu dinners from Campbell Soup are also manufactured especially for small, middle-to-upper income families and single persons. The eight-item line is packaged with a table-ready serving plate and retails for $2.39 to $3.29 per dinner. Some varieties include: Beef sirloin tips with O'Brien potatoes and brocoli with cheddar cheese sauce; sliced turkey breast with long grain and wild rice and garden vegetable medley; and sweet and sour chicken with seasoned rice and green beans with oriental vegetables. Campbell's Pepperidge Farm began testing a gourmet line of frozen entrees, as well. Pepperidge Farm Chicken Classics are not pre-baked and must be cooked before serving. The four item line retails at $3.29 to $3.49.

Gorton's of Gloucester has introduced a new lower-calorie line of fish products into the high growth category of single-serve frozen entrees. Light Recipe Seafood Entrees are reportedly of restaurant quality, each including choice seafood topped with sauce or stuffing in its own baking tray. The products are in test market and are scheduled for national introduction.

Four frozen chicken entrees have been added to Swift's line of International Entrees, bringing the line count to eight. The products, reports Swift's marketing manager, offer quality, convenience, and sophisticated taste. The microwaveable products come in six varieties: Chicken Cordon Bleu, Chicken Kiev, Chicken Lucerne, Chicken Royale, Chicken Romanoff and Chicken Parmagiana.

More foods shed calories

Even though 'lite' foods cannot be categorized into one specific food group or market segment, *Food Engineering* placed any type of reduced-fat, low-oil, and/or fewer-calorie product under this heading. With 171 entries consisting of many kinds of foods, this category finished in second place on our new products scoreboard.

Marketing strategies for these products vary. Some examples of trademarks/brand names describing these foods: Calorie Watchers, Shapely Shake, Sweet'N Low, Lite Line, Light and Natural, Under 300, Dari-Lite, Reduced-Calorie, Light 'N Lively, Trim-Line, Slimlite, Nutradiet. All of them, however, have one thing in common: Consumer appeal and a healthier, better-for-you image.

Nabisco Brands, for instance, responded to consumer trends by test marketing Fleischmann's Light Margarine. It's described by the company as being "the first lower fat, calorie spread with reduced salt content." The product is now in national distribution, and Nabisco anticipates "important incremental volume as a result."

Dart & Kraft, one of the leaders in regard to light new product introductions, explains: "There has been a marked increase in the number of light meals and snacks consumed on the run . . . Many are looking for appetizing food products that are lower in calories, fat and sodium content." Kraft introduced nine light foods between July 1982 and June 1983. Some examples: Light Philadelphia Cream Cheese, Miracle Whip Light, and Hickory Smoked Flavor Reduced Calorie Barbecue Sauce.

Geo. A. Hormel & Company is capitalizing on the light foods trend as well as on the largest selling item in the luncheon meat case, bologna. Hormel Light Bologna, says the company, fully meats the requirements of diet and nutritious concerned consumers. The product contains 50 percent less fat and 33 percent fewer calories than the company's regular bologna products. Light 'N Lean Canadian Bacon was also introduced by the company.

Other light products introduced include: Calorie Watchers Luncheon Meats from Beatrice Foods' Peter Eckrich subsidiary; Bernard Food Industries' Shapely Shake Mix sweetened with aspartame; Borden's Lite-Line potato chips, tortilla chips, and cheese puffs; and IC Industries' Fresh 'N Lite Salad Dressings.

Steady growth for cheese

With 130 new product introductions and line extensions, the cheese category ranked seventh.

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New food products . . .

Why all the excitement over cheese? Probably because consumption of cheese was up to 20 pounds per person in the U.S. for 1982. That's an 8.7 percent increase over 1981, reports the American Dairy Association (ADA).

The U.S. Industrial Outlook for 1983 reports a 3.3 percent yearly increase in per capita consumption during 1977-1982. Steady growth is evidenced here; natural, specialty and gourmet cheese especially showed their colors. Consumption of specialty and gourmet cheeses, reports the Outlook, rose at a faster pace of 4 percent annually during those years.

Other reasons for its popularity are offered by Jane Holmes of the ADA: "Popularity may be due to its natural image. A lot of it is coming along with Mexican and Italian foods; some of it is coming along with a greater interest in wine. And some consumers have a broader, more sophisticated palate.

"Cheese still, however, hasn't hit the top by a long shot," adds Holmes. "High cheese consumption is not just a 'habit' phenomenon. Many of it is due to promotion and advertising." The ADA's total media budget is more than $3-million.

Dart and Kraft is one cheese producer on FE's new products listing. Cheese and related products accounted for more than ten percent of Dart & Kraft's consolidated sales for 1982, totalling approximately $3.2-billion. Kraft introduced into test markets a five-item line of flavored soft cream cheeses consisting of strawberry, pineapple, olive & pimento, chive & onion, and toasted onion. Velveeta Individually wrapped cheese slices, as well, are new from Kraft. Although not really a "new" product, this item has been termed a "success" by the A.C. Nielsen Company. "Some observers of the new product scene argue that 'item proliferations' (such as Velveeta slices)...are not really new products. Those items are not only new, but in my opinion, they are *significantly* new...That's what we call succesfully rejuvenating mature brands, and I consider that the highest form of the product manager's art, " stresses Kenneth Carlson of Nielsen.

Universal Foods Corp., on the other hand, experienced decreased profits for their cheese business in 1982. Revenues did increase, however. Shelfmate Imitation Cheese was one major entry into the new product scene by Universal.

Agway's HP Hood rose to the top with 12 new cheese products. Cottage Combos (flavored cottage cheese) and flavored Spreadin' Soft Cream cheeses comprised Hood's entries.

International Multifoods' Kaukauna Cheese Division introduced five new products. Kaukauna is proceeding with a program for increased distribution on a national level. Nestle, too, introduced two new cheeses: Wispride American Cheese and Bacon Sandwich Spread, and Wispride Garlic and Herbs Sandwich Spread.

Flurry of cola activity

Beverage companies are carving out new niches in the $22-billion per year soft drink industry, as they respond to the latest market signals from consumers. Regular sodas, diet sodas, caffeine-free sodas, and even a salt/sodium free cola have been introduced into the market over FE's one-year period.

Fifty-five new product introductions from 15 beverage companies indicated increased activity here. New products, as well as extensive promotion, characterized the industry.

During July 1982 through June 1983, six of the largest soft drink firms introduced new soft drinks.

Colas were prominent in soft drink introductions. The cola category now accounts for 63 percent of all soft drinks, according to the National Soft Drink Association (NSDA). Royal Crown Cola opened up a brand new segment within the cola market with the introduction of Salt/Sodium Free, Caffeine Free, Sugar Free Diet Rite Cola. This is reportedly the first soft drink boasting a 5 mg sodium content per serving. Sodium is reduced in the water processing and in formulation. Desalinization equipment has been installed in the company's bottling plant, and sodium additives have been reduced. The product also contains NutraSweet, one of a probable many upcoming soft drinks to contain Searle's sweetener. The company also introduced Nehi Decaffeinated Peach Soda.

Diet caffeine-free colas are really taking hold in the marketplace. According to the NSDA, diet caffeine-free colas already account for 12 percent of total diet soft drink sales.

Caffeine-free diet sodas recorded by FE include Caffeine-free Coke, Tab and Diet Coke, all from The Coca-Cola Company. Royal Crown Bottling has come out with Sugar-Free, 99% Caffeine-Free Caprio soft drink. Sugar-Free Pepper Free is just one more product put out by Dr Pepper. Pepsi Free and Sugar-Free Pepsi Free is PepsiCola's answer to the decaffeinated product boom. PepsiCo reports these products to be an "unqualified success, far exceeding expectations."

Sugar-Free Like cola marked Philip Morris' entry into the cola market. And the Seagram name made its mark in the soft drink market during the year with a line of four mixers being distributed and manufactured by the Coca-Cola Bottling Company of New York. The line includes ginger ale, sugar-free ginger ale, tonic, club soda and seltzer. The products are being introduced through a licensing agreement with Coca-Cola.

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Fruit drinks go aseptic

Aseptics are coming on strong — strong enough to place the juices and juice drinks category into first place in FE's New Products list. Over one-third of 181 new juice and juice drink introductions are aseptically-packaged. While consumption in the entire beverage industry grew at only 1.8 percent, fruit drinks shot up an estimated 12 percent for 1982 over 1981, and they are continuing to grow in 1983.

"Aseptics will comprise almost half of the juice drink market by 1987," proposes Dr. David Dumbleton, author of an in-depth study on the aseptic market conducted in collaboration with Schotland Business Research, Inc., Princeton, N.J. "And in terms of numbers of aseptic units, juices will also exceed."

According to the study, aseptic packaging is here to stay. Volume is expected to reach 500- to 750-million 250-ml units in 1983. By 1987, says Dumbleton, four billion units are expected to be on the market.

According to Luis M. Buehler, Blocpak's vice president of marketing, sales & service, "The juice market has enjoyed an enormous growth in consumption: From 1.45-billion gallons in 1977 to 2.25-billion gallons in 1981 — almost double in four years. For aseptic packaging, this is the market area where acceptance and growth will initially come from."

In 1982, he reports, some 25-million aseptically packaged units were sold around the world containing approximately 15-million tons of liquid products."To give a perspective, approximately 50-billion packages containing 75-million tons of products were packaged non-aseptically," he adds.

The sudden surge in aseptics is reflected by national roll-out of aseptically-packaged drinks from several large companies including Del Monte (Hawaiian Punch), and Coca-Cola (Hi-C). In addition, at least 20 other companies have started marketing aseptic drinks.

In addition, many other companies are reportedly eyeing the aseptic market. Campbell Soup, for example, has purchased several commercial-scale units for its pilot operation and is in the process of 'proving them out'. New aseptic products from Campbell, reports an industry source, will soon be launched into the market.

For a listing of aseptic juices and juice drinks on the market, see FE's July '83 issue, page 67.

Another 'not-so-obvious' trend taking place in juices and juice drinks: Ready-to-serve fruit drinks. Without accounting for aseptic introductions, this category still ranks high in terms of the number of new product introductions. And that's no small feat, considering that FE's listing contains 57 categories of new products.

On both a dollar and a gallon basis, the ready-to-serve orange juice market showed its highest increase in 16 consecutive years.

Apple juice is still doing well, too. Campbell has entered the apple juice market for the first time with Pepperidge Farm Apple Juice. Sales in the apple juice industry, reports Campbell, have nearly doubled in the past five years.

Ocean Spray Cranberries, a processor of both aseptics and bottled juices and juice drinks, reports total case sales for fiscal 1982 increasing by 11 percent. Sales for the company's Cran-Grape grape-cranberry drink were up 26 percent from 1981 and up more than 300 percent since fiscal 1977. Ocean Spray's grapefruit drinks, Cranberry Juice Cocktail, and Cranapple cranberry-apple drinks all posted solid gains as well.

Variety breads still strong

The trend toward more 'natural' products that symbolize a healthy image is represented once again in new product introductions, this time in the bread category. Breads, rolls and muffins came in sixth place this year with 125 entries. The entire bread category has leveled off, with white bread consumption decreasing and variety/specialty breads taking up the slack, increasing about one percent.

"Consumer preference," states an American Bakers Association spokesman, "is the reason for growth in the variety bread area. Consumers mistakenly perceive them as being more nutritious." Consumers, he adds, are also just beginning to really accept and like the taste of them.

Many of the 125 entries consisted of grain products like Interstate Brands' Dutch Hearth Breads. The Dutch Hearth line consists of items such as Stone Ground Wheat, Seven-Grain, and Honey Whole Grain. "These products are doing very well in some test markets," reports a company spokesman, "and not so well in others."

Three Seven-Grain breads are new to the market from Campbell Taggart, Inc: Seven-Grain Stone Ground Wheat, Wheat Berry, and Old Fashioned Buttermilk Breads. Campbell Taggart acknowledges the continued consumer preference for variety breads, and calls this segment the fastest growing area of the bakery industry. Stroehmann Brothers has introduced six 'natural' breads into the market, as well, called Earth Harvest.

Pepperidge Farm is a leader in this category, with 18 new bread product introductions, two of them being Very Thin rye and multi-grain breads. About 90 percent of Pepperidge Farm's fiscal 1982 volume gain was from new products.

Recently gaining popularity in the U.S. are croissants. Three croissant varieties appeared on the market from Pepperidge Farm: walnut, chocolate and butter. Consolidated Foods' Sara Lee is forecasting its French-Style Croissants to be the company's most successful new product introduction ever. "Because of high levels of trade enthusiasm and early consumer acceptance," comments New Products Group Manager Cathy Abdun-Nur, "we've increased our marketing spending 50 percent above our original plan." All-butter, cheese and wheat and honey flavors are available; each frozen package of four retails for $1.79.

Two interesting new bread products from Pillsbury have arisen on the new product scene: Pipin' Hot Loaf Wheat Loaf and Rye Loaf. These products contain no yeast, yet reportedly have the aroma, texture, appearance and taste of yeast-baked products. Six patent applications are pending for Pillsbury's "yeast character dough". The Pipin' Hot products capitalize on the trend toward increased consumption of non-white breads, and offer the consumer "fresh, hot baked" product. Annual sales of $30 to $40 million are realistic for these products, adds Pillsbury.

Frozen desserts tout 'natural'

A decline in the population of primary ice cream consumers (between 5 and 21), together with the availability of products like ice milk, sherbert, and frozen yogurt, has increased competition for the consumer's frozen dessert dollar.

Ice cream and frozen novelty introductions rose above last year's count to total 125 entries. Companies like Borden, Carnation, Coca-Cola, Kraft, Pet and even Pillsbury contended for a piece of the action.

Fruit Bars are taking shape with more introductions than ever before. Good Humor came out with a new product called Sunkist Orange Juice Bars in a "move to capitalize on the fast-growing, health conscious orange juice category." The product reportedly is low in calories and delivers 60 percent of the USRDA of Vitamin C. According to Barry Freeman, Good Humor product manager, "The fruit bar category is emerging and appears to have considerable potential. This category has always been there, but the growing consumer interest in all-natural type products is what is causing the category to grow." Is all of this activity evident, however, when it comes to sales and profits? "Good Humor is doing well," adds Freeman.

Fruit novelties, such as this grape juice bar from Welch Foods, is a frozen dessert item just beginning to be realized in the marketplace. They reflect today's trend toward more natural, healthier foods.

Other fruit bar entries include: Hi-C Orange Bars from Coca-Cola, Tropicana frozen juice bars on a stick made of 40 percent pure juice from Beatrice, and Chocolate Coconut Cream frozen fruit bars from Shamitoff.

Cookie and ice cream sandwiches have made their debut in this segment, as well. Reportedly, Good Humor's Cookie Sandwich has become the fastest growing product in the company's history. A 300 percent increase in retail sales has been realized during a recent six-month period, which "far outpaces the most recent industry statistics that show a 7.5 percent yearly increase in total U.S. ice cream sales," reports the company.

Kraft, Inc. increased R&D and advertising and promotion expenditures in its dairy department, resulting in the test marketing of Polar Caps ice cream and cookie sandwiches, as well as the "successful" introduction of Polar B'ar ice cream squares. IC Industries' Pet came out with Big Draw Chocolate chip cookie and ice cream sandwiches.

Even Pillsbury has staked its claim for a share of the ice cream/novelty market. Spooners, a soft-serve melorine product is in two test markets right now. One major advantage, according to Pillsbury: "This product, traditionally found in foodservice outlets, can now be found on the retail shelf."

Pudding bars, too, portray a 'more nutritious' image to the consumer, which is the general consensus as to why they've become so popular. The frozen pudding-on-a-stick category now totals $100-million. Consolidated Foods' Popsicle has introduced Chocolate/Peanut Butter Good 'N Puddin pudding bars. General Foods' Jell-O arose with two additions to its existing Pudding Pops line: Chocolate Fudge flavor and Chocolate/Vanilla Swirl.

Lastly, Sanna, Inc. has acquired a second U.S. plant to double processing capacity for its Swiss Miss frozen pudding bars. In 1982, Swiss Miss Frozen Pudding Bars reportedly achieved a 20 percent share of the market.

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Successful New Product Strategies

What does it take to make a product successful? Then again, what does the word "success" really mean; and how many new product introductions actually turn out to be real successes? Most importantly, why are they successful? And why do they fail?

This year, *Food Engineering* asked the top-ranking food companies to do a little something special. We sent them our listing of new food products from the First Annual New Products Scorecard (new food products introduced between January 1980 and June 1981) and asked them to delete those items which are no longer on the market.

FE received 20 responses from major food companies. An industry-wide "success rate" of 69.5 percent was achieved. In other words, 69.5 percent of the new food products tabulated in FE's 1981 New Products Scorecard are still on the market.

Of course, just because some products are still on the market, that doesn't mean they're successful. Some may be growing slowly, some may still be in test market, and others may be just "hanging in" by the skin of their teeth.

Here's a look at how three of the top-ranking food companies treat their new products.

Campbell Soup heeds consumer

Campbell Soup is certainly one of the leaders when it comes to new product introductions. This year, the company placed first with 95 new product introductions. Campbell Soup also had the highest number of new product introductions in *Food Engineering's* first "New Products Analysis" in 1981, with 69 new products. Of those 69 entries, 57 remain on the market today. That's an 82.6 percent "success" rate, which appears outstanding, at least on the surface of it.

"For that period of time," explains Herbert Baum, vice president of marketing for Campbell, "we didn't have the same kind of new product posture that we have today. In that era, so to speak, we would probably develop products that would use up the ingredients, that would give us full utilization of the equipment, that were tested probably among the executives here at Campbell Soup in terms of acceptable taste, etc., and not do as much consumer work as we do today." Campbell's philosophy, he adds, used be "What can we make?"; whereas now it's "What does the consumer want?"

"Our products may be hanging in there," continues Baum, "but I don't think there was a really big success rate in that period of time." Campbell, like most other major food companies, terms a successful new product one which meets or exceeds profit objectives.

R. Gordon McGovern, president of the company, further emphasizes Campbell's new focus on the consumer. "Our general managers are aware that in the strategic planning of the business, we must take into account the consumer's perceptions, needs and demands regarding nutrition, safety, flavor, convenience and a whole range of eating preferences. Perceptions are especially important. Consumers may use a product only because there's no clear alternative. The producer who's smart enough to discern what consumers really want can enjoy substantial growth."

What, then *does* the consumer want? They want the ultimate in convenience, says Baum. "When I say that I mean no-pot cooking. They don't want dirty plates; they don't want dirty pots. They want to be able to cook something (probably under ten minutes) where they can just dispose of the plate or bowl and not worry about clean-up."

Product research

Consumer and market research is of utmost importance when it comes to developing a profitable new product. In addition to the traditional market research, Campbell is trying some new approaches. One is "Campbell's in the Kitchen," a consumer panel established by the company's Creative Food Center. This gives the company direct access to about 75 households from across the U.S. On a regular basis, Campbell visits these homes to study lifestyles, kitchen equipment and appliances, shopping habits, recipe sources and other food use issues.

"We're sending our home economists into some of the households to work with cooks on a one-to-one basis, to go food shopping and to exchange ideas," says McGovern. "This connects the consumer with Campbell's product development and marketing efforts."

Le Menu, for example

When Campbell Soup introduced Le Menu, an upscale line of frozen dinners, the first thing they did was take the concept of an upscale frozen dinner on a table-ready serving plate to consumers. "We wanted to see what the appeal for that product was aginst a given price," reports Baum. With that information, (the concept was successful) Campbell asked their product development people to make up a series of products that would fit the acceptable concept (type of meat, vegetables, etc.).

"Then, we went back to consumers with the product to see if they believed the product had lived up to that concept which was initially acceptable to them. We also put a

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price against that," reports Baum. Since the success pattern was still good, they put together a national marketing plan for that product and then scaled it down to a test.

"In the case of Le Menu, we used the West Coast and a portion of Texas," says Baum. At a nationally projected dollar rate, Campbell then went into test market to try out the market and the product to see if they met objectives. Once that's successful, then the product is rolled out.

"The main core of our new product planning and development is:, "Does the concept fulfill a consumer need; and is the product good enough to live up to the concept?," states Baum.

"We do a whole lot of testing of the actual product itself — refining it each day along the way to make sure we've given the consumer exactly what they want.

"The idea of a fad product really doesn't fill our new product philosophy. We hope that our products have a longer life cycle than that — five years or more, hopefully forever," adds Baum. Campbell's Star Wars Cookies, for example, did "terrific" in its introductory phase, but Baum feels as though they may not succeed. The cookies are now in their secondary phase and results are not yet available.

Prego a success

Prego, says Baum, is one of Campbell's most successful new products ever. Why? Prego created another segment in the prepared spaghetti sauce market, says Baum. "It appealed to people who traditionally had made homehade spaghetti sauce."

During initial consumer testing of the product, 65 percent of those tested felt that Prego was as good as or better than their own homemade spaghetti sauce. "We really were surprised and pleased at the fact that it did as well as it did, comments Baum. "We were originally looking for a ten percent volume share of the prepared spaghetti sauce market. Today, we're sitting on a 22 percent share." The future for the product, he says, is hard to predict. "We hope to get an even bigger share."

Off the market

New product introductions, however, are not made up of successes alone. V-8 Ketchup is one product introduced by Campbell during January 1980 through June 1981 that has been withdrawn from the market. "This product was taken off the shelves because it was higher priced than regular ketchup, and there is really no dissatisfaction with regular ketchup to begin with," says Baum.

The regular user base of V-8 Juice is about six percent of the population. "V-8 Ketchup was the case of a product we put out there just because we could. We were trying to capitalize on the brand name and it just didn't fly," reports Baum.

General Foods' philosophy

Ranking in 12th place this year with 41 new products is General Foods. The company came in first last year with 65 entries, and finished second in 1981 (which encompassed the period January 1980 through June 1981). Thirty-four out of 55 products introduced in that 1980-1981 period are still on market today. That means 61.8 percent of those 55 products have been "successful."

General Foods' volume progress for fiscal '82 was based to a large extent on successful new products and marketing programs. "These will continue to benefit the company's growth in fiscal 1983 and beyond," says the company.

General Foods begins their new product development with HUTS — or Home Use Testing — by taking a new product into a limited number of actual households. "We ask consumers to prepare the product as if it were available on the retail shelf, and we record their responses. If these responses are successful," reports Ken Defren, manager of corporate communications for the company, "we then put the product into limited test markets."

"We also utilize our market research department very much," he explains. "We're always looking for trends in consumer attitudes."

Success

What, according to General Foods, really is a "successful new product?"

"We set profit and volume objectives for each product we place on the market," says Defren. "Velocity objectives are also pre-determined — that is, how quickly a product is expected to move on the retail shelf. If our ROI (Return on Investment) is not met, the product will be removed from the market."

"The term success means something different for each product because investment, testing, and other factors are different for each product," adds Defren.

Quality is key

This company's new product theroy is geared toward the consumer, as well. "Our new product philosophy boils down to one thing — quality," says Defren. Quality products are what the consumer prefers, he says.

Quality is the reason why Sugar-Free Kool-Aid has been such a spectacular success, according to Defren. "The quality of our flavors as well as the fact that our product offers a sugar alternative (aspartame) are two reasons for this product's success," adds Defren. "Price, too, is another key to success here." Sugar-Free Kool-Aid costs the consumer about 10¢ per serving. Sugar-Free Kool-Aid was introduced

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into national markets this past spring, and has far exceeded its profit objectives.

"We went through HUTS with this five-flavor line of Sugar-Free Kool-Aid, then into test marketing in Phoenix, Tuscon, Milwaukee, and upstate New York," says Defren. "And even before the HUTS, we experimented quite a bit with our sweetness levels. We had to make sure our flavor systems were compatible with the aspartame." When it comes to product acceptance, results were extremely good, reports General Foods.

"We always try to create a niche in a market or find a consumer need for a specific product," adds Defren. For instance, General Foods created a whole new category when they came out with Shake 'N Bake, he reports. That, he says, is what makes a new product successful.

One of the products on General Foods' 1980-1981 list of introductions that can no longer be found on the market is Diet Country Time. "This product was taken off the shelf because it contains saccharin," says Defren. The consumers did not want an artificially-sweetened powdered lemonade mix."

"Redeployment" at Borden

The company is in the process of a major redeployment program. According to Eugene J. Sullivan, chairman and CEO of Borden, "Our redeployment program is helping to finance a $1.5-billion espansion of our assets. We began the program in 1980, and by the start of 1982 had completed its divesture phase, shedding low-return businesses or those that no longer fitted our future . . . We have unburdened our Consumer Products Division of low-margin, commodity-oriented operations in sugar refining and bulk cheese; strengthened it with acquisitions and capital projects in snacks and pasta; . . . increased its marketing and research and development expenditures."

"Redeployment allows us to concentrate on new products where we do have a profitable business," comments company spokesperson Betty Garrett.

Borden, too, concentrates its new product strategies on the consumer. "Appropriate market research must be carried out to determine that there is in fact a need for a product," comments Garrett. Developing quality products to fit that need comes next. "You can determine a need, but if you don't develop through research and development a quality product that people want to consume, then identifying that need doesn't do any good."

Borden begins its new product development with consumer research of various kinds. The company studies basic trends and general areas of interest to the consumer. These findings are then refined and specific market research is carried out on the category and the type of product which best fits into the need.

"We use focus groups in the concept stage," says Garrett. Basically, a focus group is a chosen group of people gathered together in an informal discussion situation. The participants will fit into the demographics of the audience that Borden is trying to reach.

Focus groups give Borden guidelines to follow before any real in-depth research is carried out. "We always do a lot of research on the product itself once it has been chosen," reports Garrett. Questions such as: "Do they like the product;" "Would they purchase it?;" "Would they purchase it again?;" and "If so, would they purchase it on a regular or infrequent basis?" are asked about specific products. This determines the viability of the product. If the product is viable, it then goes into test market, and results are measured. Either regional or national distribution is the next step, according to Garrett.

Lite-Line a hit

Food Engineering asked Borden which of its products on the 1980-1981 list was the most successful. The answer was not a single product, but an outstanding *line* of products: Lite Line.

"We started out with Lite Line in the early 70's when we began to identify a growing consumer concern with health and fitness," comments Garrett. "We introduced a low-calorie processed cheese called Lite-Line, and that openend up a whole new category in the cheese section."

Back in the 1970's, most emphasis in the diet/health category was on the dieter himself; whereas today, concern lies with the overall, fitness-oriented population. Borden's Lite-Line products have changed along with this trend. "Our line is successful because we've identified a strong and growing consumer concern — fitness," reports Garrett, "and because our line changes as consumers develop and refine their fitness concerns." The line of Lite-Line products now includes not only lower-calorie items, but lower-in-fat and lower-in-cholesterol products as well.

Lite-Line cheese products and yogurts have reportedly been very successful. This year, Borden introduced low-sodium, reduced-sodium, and low-cholesterol cheese varieties. They're doing well, too, says the company. The newest additions to the line include low-sodium bouillon, and a three-item line of less fat, fewer-calorie snacks.

"Lite Line has really helped to strengthen and build our business," says Garrett. "The success of a new product lies in identifying a consumer need, developing a quality product, doing the research to make sure it is not only a good product in the mind of the consumer but that it is positioned right, and in following-up with strong marketing programs."

Field Report

CO_2 less expensive than N_2 for quick-freezing meat patties

How CO_2 is used for freezing hamburger patties

	CO_2 Spiral Freezer	N_2 Belt Tunnel Freezer
Required freezing capacity (Btu/hr)	450,000	450,000
Installed freezer cost ($)	$233,090	$146,575
Refrigerant ($/day)	$1,218	$1,582
Other operating costs ($/day)**	$283	$241
TOTAL OPERATING COST ($/day)	$1,501	$1,823

Chart compares CO_2 with N_2 for freezing 3,600 pounds of hamburger patties per hour. Based on a one, 8-hour shift, CO_2 is $322 cheaper per day. Other operating costs include depreciation, interest, power, maintenance, etc.

Consider a few projections about cryogenic freezing during the next five or six years:

- The greatest growth area will be in quick-freezing red meat and chicken, especially fast-food patty type products.
- The majority of companies installing new cryogenic freezing systems will chose liquid carbon dioxide refrigerant in preference to liquid nitrogen.

These projections are from an industry forecast by David Baron, manager of freezing systems for Airco Industrial Gases, Murray Hill, NJ. Baron is in a good position to judge refrigerants since Airco designs, supplies, and builds both CO_2 and N_2 freezers and gases.

"The trend to cryogenic freezing isn't surprising," says Baron, "since it preserves flavor and freshness at their peak. And, there are virtually no moisture losses, so products like hamburger patties retain their juiciness. What's more, because there's no dehydration, yields are higher."

Baron reports both CO_2 and N_2 systems freeze hamburger patties efficiently. Liquid CO_2 is generally applied at a temperature around −80°F. Liquid N_2 is applied at lower temperatures—about −150°F. Both refrigerants have high heat transfer coefficients for quick freezing. While CO_2 isn't as cold as N_2 it's more than cold enough to bring down the temperature of hamburger patties from 40°F to zero in minutes.

The specific refrigeration value of CO_2 is 120 BTU/lb of gas (inside a spiral freezer), while the value for N_2 is 151 BTU/lb (tunnel freezer). Since more refrigerant is required, CO_2 freezers are bigger and hence more expensive than N_2 with the same capacity.

On the other hand, CO_2 typically costs about one-third less per pound than N_2 in most parts of the country. The reason: it takes about five times more energy to produce a pound of N_2 than it does to produce a pound of CO_2.

At today's prices, CO_2 is the better buy, even taking into account its lower refrigeration value. Continued escalation of energy costs should make it an even better buy in the future.

Freezing cost example

Quick-freezing hamburger patties with a CO_2 system often results in the lowest possible freezing cost per pound of product. But economic evaluations must be performed on a case by case basis. An example follows.

In this case, patties are quick-frozen at the rate of 3,600 lb/hr during an 8-hr work day. The patties are valued at $1.50 per pound. During the freezing process their temperature is reduced from 40°F to 0°F. The refrigeration requirement is 124 BTU/lb of product.

As shown above, the initial cost of the N_2 freezer is considerably lower than that for the CO_2 freezer. But the cost of refrigerant for the N_2 freezer is considerably more—$1,582/day as opposed to $1,218 per day with CO_2 freezing. This is based on consumption of 0.96 pounds of N_2 per pound of product and 1.14 pounds of CO_2.

In this case, using a CO_2 freezer results in a savings of $322/day in operating costs. Even though the CO_2 freezer costs more initially, it becomes the better buy in the long run.

Baron also points out that CO_2 is a more cost-effective refrigerant for chilling as well as freezing. For example, it's better for chilling beef for patties from 40°F to 30°F.

For blending, N_2 is applied as a cold liquid, which has a specific refrigeration value of only 86 BTU/lb. CO_2 is applied in the form of snow, and has a specific value of 110 BTU/lb. Thus, less refrigerant is needed for chilling with CO_2.

Retrofitting for profit

Companies already using N_2 freezing and chilling systems aren't necessarily cut off from the benefits of CO_2 systems, according to Baron.

"Existing N_2 freezing and chilling systems often can be converted to use CO_2. The cost of retrofitting is far lower than the cost of purchasing a new cryofreezing or cryochilling unit. And more often than not, the long-term payback is substantial."

Based on information from Airco Industrial Gases, Murray Hill, NJ.

Circle 557